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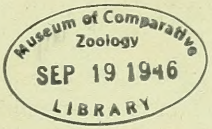
Bulletin of the Museum of Comparative Zoölogy
AT HARVARD COLLEGE
VOL. 97

THE SALTICIDAE (Spiders) OF PANAMA



ARTHUR M. CHICKERING
Albion College

CAMBRIDGE, MASS., U. S. A.
PRINTED FOR THE MUSEUM
SEPTEMBER, 1946

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AT HARVARD COLLEGE

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Bulletin of the Museum of Comparative Zoölogy
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THE SALTICIDAE (Spiders) OF PANAMA

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The Salticidae (Araneae) of Panama

Arthur M. Chickering

TABLE OF CONTENTS

	Page
Introduction	5
Lyssomaninae (Chinoscopus, Lyssomanes)	7
Salticinae	33
Marpissa Group (Breda, Marpissa, Menemerus, Parkella)	36
Itata Group (Itata, Mica)	54
Rudra Group (Balmaceda, Mabellina, Rudra)	57
Thiodina Group (Albionella, Banksetosa, Carabella, Cotinusa, Psecas, Scopocira, Thiodina, Toloella)	73
Phiale Group (Chapoda, Chira, Compsodecta, Corythalia, Freya, Gorgasella, Monaga, Phiale, Plexippus, Sidusa)	111
Jollas Group (Jollas)	241
Metaphidippus Group (Ashtabula, Atelurius, Avitus, Beata, Cheliferoides, Donaldius, Habronattus, Metaphidippus, Parahentzia, Paraphidippus, Parnaenus, Phidippus)	246
Amycus Group (Amycus, Cobanus, Titanattus)	346
Zygoballus Group (Bryantella, Cylistella, Dryphias, Orvilleus, Zygoballus)	389
Peckhamia Group (Peckhamia, Uluella)	414
Zuniga Group (Chirothecia, Descanso, Donatinus, Sebastira, Zuniga)	425
Sarinda Group (Erica, Fluda, Myrmarachne, Paradamoetas, Parafluda, Sarinda, Simonella)	453
Bibliography	469
Index	470

LIST OF ILLUSTRATIONS

Figs.	1–10	18
"	11–15	31
"	16–26	41
"	27–35	52
"	36–47	60
"	48–57	69
"	58–64	77
"	65–72	83

Page

Figs. 73–85 92
" 86–95 101
" 96–108 109
" 109–115 119
" 116–126 135
" 127–138 144
" 139–148 160
" 149–159 180
" 160–169 194
" 170–180 210
" 181–189 221
" 190–197 231
" 198–209 244
" 210–220 255
" 221–232 269
" 233–241 279
" 242–251 290
" 252–263 301
" 264–272 307
" 273–283 318
" 284–291 329
" 292–298 338
" 299–308 344
" 309–323 361
" 324–336 373
" 337–347 388
" 348–359 398
" 360–371 406
" 372–382 420
" 383–391 428
" 392–403 431
" 404–412 443
" 413–421 451
" 422–432 462

F. Cambridge ('01) listed two hundred and sixty-six species of Salticidae from all of Central America including many not in the collections studied by him and known only from records made by other students of the family. Petrunkevitch ('25) listed one hundred and six species including several conjectured to be present in Panama but not definitely recorded from the country. Among these were described eight species as new to science. Banks ('29) reported sixty-one species, mostly from the Canal zone. Twelve species were regarded as new to science. Chamberlin and Ivie ('36) described eighteen new species from my collection of 1928. Most of these have proved to be synonyms of known species and are referred to in the appropriate parts of this paper. From my collections of 1934, 1936, and 1939 I have separated out one hundred and seventy-two species. Among these eighty-one species are considered new and are described as such. Twenty-nine holotypes are accompanied by their allotypes. Twelve allotypes of previously known species have been identified and described in detail, and numerous hypotypes have also been described. Fourteen new genera have been established for those species which seemed to have no place among the known genera. Altogether, more than two hundred species of Salticids are now known from Panama.

The problem of the subdivision of the family Salticidae into subfamilies and smaller groups remains one of the major questions facing all arachnologists interested in the family. F. Cambridge ('01) divided all Central American Salticidae into two subfamilies, the Toxeinae and the Salticinae. He included in the former all which he considered pedunculate and in the latter all those not pedunculate. While most students of the family would disagree with Cambridge in respect to such a division into subfamilies, I believe he showed, on the whole, a good understanding of natural relationships in his groupings within the Salticinae. Simon ('01) in his great Histoire Naturelle des Araignées worked out a very complete but highly artificial system of classification for the family. He divided all Salticidae into three divisions, the Unidentati, Fissidentati, and the Pluridentati. Those with no teeth on the retromargin of the fang groove he placed with the Unidentati. In his Systema Aranearum, Petrunkevitch ('28) discussed the inadequacies of Simon's system but found no satisfactory alternative. This resulted in his making the same fundamental subdivision into three major divisions after which he arranged Simon's "Groupes" into twenty-three subfamilies. Throughout his subsequent writings this author (1929–1930, 1939, 1942) has followed the same

system with minor changes although he has frequently expressed his dissatisfaction with it.

Banks ('29) recognized among his Panamanian spiders only the subfamilies Attinae and Lyssomaninae. The former he separated into the following groups: Marpissini, Rudrini, Dendryphantini, Habrocestini, Ballini, Amycini, Phyalini, and Synemosynini. Bryant ('40) followed Petrunkevitch's Systema Aranearum "since it includes all spider genera known up to that time and is the one at present used in the Zoölogical Record".

After struggling with this problem for several years I have decided to recognize for the present only two subfamilies, the Lyssomaninae and the Salticinae. The latter I have broken up into several groups based upon what I regard as features which express a natural relationship. In the light of knowledge which has accumulated during the past fifty years I think considerable success may attend the effort to arrange all of the Salticidae from Panama into their natural groups, although I realize quite well that few will be satisfied with my treatment of these. It is, however, my earnest hope that the work presented in this paper will help later students of the family to resolve the troubles which they are certain to encounter. For convenience, all genera and species are arranged alphabetically within their respective groups.

Through their generous support of my work, the directors of the Horace H. and Mary A. Rackham Fund have made it possible for me to spend the summers of 1934, 1936, and 1939 in Panama collecting and studying in the field. Mr. Nathan Banks, Dr. Joseph C. Bequaert and Miss Elizabeth B. Bryant, all of the Museum of Comparative Zoölogy at Harvard College, have on numerous occasions since 1934 extended every courtesy of their laboratories to me. The use of the collections of spiders in the Museum of Comparative Zoölogy and especially of the Peckham types of salticids have been of inestimable value. A grant-in-aid for the summer of 1945 made by Dr. Thomas Barbour, Director of the Museum of Comparative Zoölogy, made it possible for me to complete this study. It is with a deep sense of gratitude that I make acknowledgements for these specific aids and for others too numerous to mention. Without the help of these supporters and friends my work of the past ten years would have been impossible.

I am also pleased to be able to state that all types established in this paper are deposited in the Museum of Comparative Zoölogy.

Family SALTICIDAE

Key to the subfamilies of Panamanian Salticidae

1. Eyes in four distinct rows, the ALE definitely behind AME. *Lyssomaninae*, (p. 7)
1. Eyes in three rows, the ALE not distinctly behind AME. *Salticinae*, (p. 33)

LYSSOMANINAE [1]

Key to the genera of Lyssomaninae from Panama

1. Small and very slender spiders; with long slender legs; quadrangle of laterals nearly twice as wide as long; AME protrude far beyond base of chelicerae..... *Chinoscopus*, (p. 7)
1. Larger and much more robust spiders; with moderately robust legs; quadrangle of laterals much less than twice as wide as long; AME not greatly extended over base of chelicerae. *Lyssomanes*, (p. 8)

Genus Chinoscopus Simon, 1901

Chinoscopus flavus (Peckham), 1888

Figure 1

Asamonea flava Peckham, 1888
A. flava F. Cambridge, 1901
C. flavus Simon, 1901
C. flavus Petrunkevitch, 1911
C. flavus Banks, 1929

The Peckhams described this species from a female whose habitat was given simply as Central America. There is, however, a specimen in the Peckham collection from Chiriqui (Panama ?) labelled "Type". F. Cambridge did not have the species in his collection. Banks ('29) discovered the male and gave it a brief description with a simple figure of the palpus. His specimen was from Fort Davis, C. Z., July, 1924. I have collected both males and females in the following localities: Canal Zone Biological Area, June–July, 1934; June, August, 1939; Canal Zone Forest Reserve, C. Z., August, 1939; Porto Bello, R. P.,

[1] *Lyssomonea saphes* Chamberlin and Ivie is believed to be a synonym for *Amycus benignus* (Peckham) and is so treated in this paper.

August, 1936. A detailed drawing of the palp is given here to bring out the following features: patella short and without special modifications; tibia flattened and ridged in a way difficult to describe briefly; bulb with keel-like structure at basal retrolateral corner, much swollen distally and with a finger-like process tipped by a short black spine (Fig. 1).

Genus Lyssomanes Hentz, 1844

Petrunkevitch ('25) listed eight species of this genus as occurring in Panama, but some were included because they had been reported from Central America without definite locality. Banks ('29) reported four species of which two were described as new. I have been compelled to transfer *L. completus* Banks to the genus Itata and to describe the species reported by him as *L. mandibulatus* F. Cambridge as a new species. A study of the type of *L. patens* Peckham has also enabled me to synonymize *L. trifurcatus* F. Cambridge with it. Omitting the species for which definite records are lacking, we may now consider that we know of fifteen species which occur in Panama. They may be listed as follows: *L. banksi* sp. nov.; *L. bryantae* sp. nov.; *L. consimilis* Banks; *L. deinognathus* F. Cambridge; *L. dissimilis* Banks; *L. elegans* F. Cambridge; *L. eatoni* sp. nov.; *L. jemineus* Peckham; *L. montanus* sp. nov.; *L. patens* Peckham; *L. parki* sp. nov.; *L. remotus* Peckham; *L. shropshirei* sp. nov.; *L. simplicipes* F. Cambridge; *L. zeteki* sp. nov. Only three species are yet known from both sexes: *L. dissimilis* Banks; *L. jemineus* Peckham; *L. patens* Peckham. I have a total of thirteen of the known species in my collection.

Key to the species of Lyssomanes from Panama

Males

1. Palpal tibiae with a cluster of long slender dorsal spines usually near middle of segment, at least somewhat swollen where spines are inserted (*deinognathus, dissimilis, jemineus,* and *patens*) 2
1. Palpal tibiae without a cluster of long slender dorsal spines near middle of segment, not swollen near middle of segment (*banksi, consimilis, remotus, simplicipes,* and *zeteki*) 6
2. Retromargin of fang groove with eight teeth, the last three near base of fang closely crowded together; from ten to thirteen dorsal distal spines on basal segment of chelicerae; fang with a tooth near base on prolateral side; distal half of first metatarsi well fringed; retrolateral distal palpal tibial apophysis only a small nodule ..... *L. deinognathus* (p. 17)

2. Not with combination of characters given above.....3
3. Retromargin of fang groove with about seven distinct teeth, only one near base of fang, but this one with a cusp at its base and a low tubercle nearby; a group of about three fairly stout distal dorsal spines on basal segment of chelicerae; fang without any tooth near its base; first metatarsus only weakly fringed if at all. Palp: retrolateral distal palpal apophysis only a slight tubercle; embolus a long conspicuous prolateral stylus *L. dissimilis*, (p. 17)
3. Not with combination of characters given above.....4
4. Retromargin of fang groove with eight spines, two close together near base of fang, one large, one small; first metatarsi and first tibiae both well fringed in distal third. Palp: distal tarsal apophysis bifurcated distally; retrolateral distal tibial apophysis a small simple spur. *L. jemineus* (p. 21)
4. Not with combination of characters given above.....5
5. Retromargin of fang groove with six teeth, the last isolated and stout near base of fang; basal segment of chelicerae without distal dorsal group or cluster of spines; distal third of first metatarsi well fringed. Palp: retrolateral distal tibial apophysis a simple short blunt extension; distal tarsal apophysis divided at base and again distally.....*L. patens*, (p. 26)
5. Not with combination of characters given above.....6
6. Retromargin of fang groove with nine teeth, three crowded together near base of fang; basal segment of chelicerae with about seven dorsal distal spines in a cluster. Palp: cymbium nearly three times as long as tarsal bulb; distal tarsal palpal process a simple long stout curved hook; membranous process clavate and of moderate length; tibial retrolateral distal apophysis a blunt somewhat flattened spur. First metatarsi fringed through distal third.....*L. banksi*, (p. 12)
6. Not with combination of characters given above.....7
7. Retromargin of fang groove with seven teeth, none crowded together near base of fang; basal segment of chelicerae without a cluster of dorsal distal spines; first metatarsi not fringed. Palp: cymbium less than twice as long as bulb; distal tarsal process a slender spine hooked distally and arising from a massive base; membranous process of bulb short, broad; retrolateral tibial process a stout broad, nearly dorsal spur. *L. consimilis*, (p. 17)
7. Not with combination of characters given above.....8
8. (Taken from F. Cambridge's description) Retromargin of fang groove with five ? teeth; first metatarsi well fringed in distal third. Palp: cymbium less than twice as long as bulb; distal tarsal process broad at base, but distally ends in a simple hook; no long conspicuous embolus; prolateral tarsal process a nearly straight spine attenuated distally. *L. remotus*
8. Not with combination of characters given above.....9
9. (Taken from F. Cambridge's description) Retromargin of fang groove with only three teeth, the outer one stout, near base of fang with two tubercles at its base; basal segment of chelicerae with about nine distal dorsal

spines in a loose cluster; first metatarsi with only a scanty fringe in distal quarter. Palp: tibia about five times as long as broad in middle; cymbium more than twice as long as bulb; distal tarsal process massive at base, terminating in a hook; tibial retrolateral apophysis a short, blunt spur. *L. simplicipes*

9. Retromargin of fang groove with seven teeth and a low tubercle, the two latter close together near base of fang; basal segment of chelicerae with a cluster of six spines near distal end on dorsal surface; first metatarsi without a fringe. Palp: tibia about 2.5 times as long as wide in middle; cymbium somewhat less than twice as long as bulb; distal tarsal process thin, low, curved, and ends in a hook of moderate length; membranous process short and blunt; prolateral process nearly straight, constricted and pointed at tip; retrolateral distal tibial apophysis a short small blunt spur. *L. zeteki*, (p. 29)

Females

Color is notoriously untrustworthy for use in keys, but its use may aid to some extent.

1. Retromargin of fang groove with six teeth. First tibiae with four pairs of ventral spines, none terminal. Color in alcohol: eyes on black spots, but elsewhere unicolorous yellowish-white. Epigynum: no posterior marginal notch; two large spermathecae near posterior border about the diameter of one of them apart; with two small lateral openings in a transversely depressed area just behind anterior border..... *L. bryantae*, (p. 14)
1. Not with combination of characters given above.....2
2. Retromargin of fang groove with seven teeth. First tibiae with five pairs of ventral spines, none terminal. Color in alcohol: yellowish-white with eyes on black spots; considerable reddish hair in ocular area; grayish along ventral border of carapace and also medially in posterior half; abdomen with two dark dorsal stripes to middle where a transverse dark band occurs, followed by a large dark transverse spot near posterior end. Epigynum: posterior border gently scalloped but not notched; with two oval spermathecae just in front of posterior border; two small curved openings lateral in position near anterior border; several internal tubules visible..... *L. dissimilis*, (p. 17)
2. Not with combination of characters given above.....3
3. Retromargin of fang groove with seven teeth, last one near base of fang, the largest. First tibiae with irregularity in placement of four pairs of ventral spines. Color in alcohol: yellowish-white with eyes on black spots and a small dark distal prolateral and retrolateral spot on first tibiae as well as a small dark proximal retrolateral spot. Epigynum: with a deep but obscure posterior marginal notch; two large spermathecae almost contiguous; two small lateral openings near posterior border..*L. eatoni*, (p. 19)
3. Not with combination of characters given above.....4

4. Retromargin of fang groove with five teeth, the last one large and some distance from base of fang. First tibiae with three pairs of ventral spines, none terminal. Color in alcohol: yellowish-white with eyes on black spots and with some reddish hair in ocular area. Epigynum: with no distinct posterior marginal notch; two large spermathecae near posterior border, about one half the diameter of one of them apart; a recurved slit near anterior border probably ends in minute openings laterally. *L. elegans*, (p. 21)
4. Not with combination of characters given above 5
5. Retromargin of fang groove with six teeth, last one largest and considerably removed from base of fang. First tibiae with four pairs of ventral spines, none terminal. Color in alcohol: generally yellowish-white with eyes on black spots and considerable reddish hair in ocular area; two faint grayish stripes dorsolaterally on abdomen. Epigynum: with a central, nearly circular white body, whose borders lead to a shallow posterior marginal notch, lying between two large spermathecae more than a diameter of one of them apart; just anterior to central white body is a pair of small openings in front of which are internal tubules transversely placed ..... *L. jemineus*, (p. 21)
5. Not with combination of characters given above 6
6. Retromargin of fang groove with eight teeth, the last the largest and near base of fang. First tibiae with four pairs of ventral spines. Color in alcohol: generally yellowish-white with eyes on black spots and some reddish hair in ocular area. Epigynum: plate large, moderately swollen; a pair of small oval spermathecae close together and about one third of length of plate from posterior border; anterior border a curved line; two long, somewhat curved slits extend posteriorly from anterior border; a very shallow and broad posterior marginal notch .. *L. montanus*, (p. 22)
6. Not with combination of characters given above 7
7. (Taken from F. Cambridge's table) Epigynum: very simple; "a long, broad, convex area, marked with four red-brown curvilinear spots, traces of the oviducts and perhaps orifices, forming a rectangle longer than broad" ..... *L. patens*, (p. 26)
7. Not with combination of characters given above 8
8. Retromargin of fang groove with seven teeth, innermost the smallest, outermost the largest. First tibiae with four pairs of ventral spines. Color in alcohol: generally yellowish-white; eyes on black spots; considerable red and white lanceolate hair in ocular area; a pair of small dorsal gray spots near middle of abdomen and another pair of dorsal gray spots elongated through last quarter. Epigynum: fairly large; with a posterior marginal notch; central part of plate swollen; a pair of spermathecae near posterior border more than twice the diameter of one of them apart; anterior half of plate with a pair of fairly large shallow depressions ..... *L. parki*, (p. 24)
8. Retromargin of fang groove with six or seven teeth, largest near base of fang. First tibiae with four pairs of ventral spines, none terminal. Color

in alcohol: eyes on black spots with red and white lanceolate hair in ocular area; generally yellowish-white; a pair of small grayish dorso-lateral abdominal spots near posterior end. Epigynum: simple; a shallow posterior marginal notch with a chamber dorsal to it; two large oval spermathecae about a diameter of one of them apart; a pair of circular areas about a diameter of one of them apart near anterior border.....

L. shropshirei, (p. 27)

Lyssomanes banksi spec. nov.

Figures 2–4

Mr. Banks ('29) collected a male of this species on the Canal Zone Biological Area and identified it as L. mandibulatus F. Cambridge. He also had a female which he considered to belong to the same species. I have made a careful study of these and of my specimens and I have been forced to consider them as representatives of a species new to science, but probably closely related to L. mandibulatus F. Cambridge.

Male holotype. Total length (exclusive of the chelicerae) 5.76 mm. Carapace 2.43 mm. long, 1.79 mm. wide at some distance behind PLE which occupy about six thirteenths of the width of the carapace at their level, 1.47 mm. tall and, therefore, .82 as tall as wide; all eyes except AME on a raised platform; descent from PLE steep to posterior border; the long median longitudinal thoracic groove begins a short distance behind PLE and lies opposite widest part of carapace; with very little hair except that on cephalic ocular platform where it is highly colored as will be noted later.

Eyes. Eight eyes in four rows. First row slightly wider than second row, in ratio of 49 : 47; second row wider than fourth row in ratio of 47 : 35, wider than third row in ratio of 47 : 25. Quadrangle of laterals wider than long in ratio of 47 : 40. Total eye space occupies nineteen thirty-sixths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 25 : 13 : 2 : 12. AME barely separated from one another, from ALE by three twenty-fifths of their diameter. PME closer to ALE than to PLE in ratio of 8 : 13. Height of clypeus equal to nine twenty-fifths the diameter of AME. Clypeus decorated with a brush of white appressed lanceolate hair over ventral two thirds and a few fiery red hairs over dorsal third, three long, gently upturned, yellowish bristles in lower angle between AME, not in usual triangular position but more in a downwardly curved row.

Chelicerae. Robust, strongly produced, strongly divergent from bases, porrect, basal segment 1.92 mm. long, with well developed

basal boss; basal segment with two stout spines on medial margin of dorsal surface about a quarter of its length from base, and a group of six or seven dorsal spines near distal end. Fang long, fairly slender and very sinuous. Fang groove with four promarginal teeth, one obtuse near base of fang, another about two thirds from base of fang and finally two more at medial end of groove; retromargin with a row of six increasing in size from medial end of groove to near base of fang where a group of three occur closely crowded together, thus making nine in all (Fig. 4).

Maxillae. Parallel, longer than wide in ratio of 2 : 1, moderately dilated distally, middle of outer border hardly notched at all, outer distal angle well rounded, distal border and outer border essentially perpendicular to one another.

Lip. Longer than wide in ratio of 10 : 9, basal excavations reach about one third the length of organ, reaches well beyond middle of maxillae. Sternal suture straight.

Sternum. Broadly scutiform, as wide as long, widest between second coxae, nearly as wide between first and third coxae, anterior border much wider than base of lip, posterior end broadly rounded, extends slightly between fourth coxae which are separated by eight elevenths of their diameter.

Legs. 1243. Tibial index of first leg 8, of fourth leg 10.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	3.00	1.02	2.81	2.54	.51	9.88
2.	2.49	.96	2.11	2.18	.48	8.22
3.	2.18	.83	1.86	2.18	.51	7.56
4.	2.18	.65	1.92	2.37	.51	7.63
Palp	1.79	.57	.90	—	1.34	4.60

All legs long and slender; with a moderate amount of hair; a somewhat increased number of bristles at distal ends of first and second metatarsi but no definite fringes or tufts.

Spines. First leg: femur dorsal 1–1–1, prolateral and retrolateral 0–1–1; patella 0; tibia prolateral 0–0–1–0, retrolateral 0–0–1–0, ventral 2–2–2–2 (not terminal); metatarsus only retrolateral 1–0–0, ventral 2–2–2. Second leg: as in first except tibia ventral with irregularity in placement and metatarsus prolateral 1–0–0–0. Third leg: femur as in first; patella only dorsal 0–0–1; tibia dorsal 1–0–1–0, prolateral and retrolateral 0–1–0–1–0, ventral 0–0–1r–0; metatarsus pro-

lateral 1–1–1, retrolateral 1–1–0, ventral 2–0–0. Fourth leg: femur and patella as in third except femur retrolateral only distal 1; tibia dorsal 1–0–1–0, prolateral and retrolateral 0–0–1, ventral 0; metatarsus 0. Palpal spines: femur dorsal 0–1–1, prolateral and retrolateral distal 1; patella only one dorsal distal; tibia only prolateral 0–1–0–0.

Palp. Femur long, slender, and only slightly bent ventrally; tibia more than five times as long as broad in middle; tibia with no distinct tuft of dorsal bristles, only five or six distributed over distal four fifths; tibial retrolateral apophysis a single short blade-like process apparently opposed to a sharp ridge on tarsus; tarsus complicated, with a long slender clavate cymbium; bulb with four distinct processes at distal end, the most retrolateral stout at base and slightly spiraloid distally, the median process a low tubercle, the prolateral process a stout distally spiraloid spine, the fourth process is a flat transparent membranous structure which projects between what I consider the embolus and the conductor (Figs. 2, 3).

Abdomen. Longer than wide in ratio of nearly 3 : 1, widest one fourth from base; all other features essentially as described for L. parki sp. nov.

Color in alcohol. Carapace: light amber in general; ocular region with much fiery red lanceolate hair, white below ALE and PLE. Mouth parts and sternum different shades of amber. Legs: generally light amber; first tarsi brownish and distal ends of first tibiae and metatarsi likewise; other legs like first but lighter with third and fourth tarsi light amber. Abdomen: yellowish-white with a pair of grayish dorsolateral stripes from base to near spinnerets, almost divided just behind the middle.

Type locality. Male holotype from Canal Zone Biological Area, C. Z., July, 1936. No paratypes.

Lyssomanes bryantae spec. nov.

Figure 5

Female holotype. Total length 7.36 mm. Carapace 2.69 mm. long, 1.98 mm. wide at some distance behind PLE which occupy slightly more than one half the width of the carapace at their level, 1.47 mm. tall and, therefore, .74 as tall as wide, all eyes except AME on elevated cephalic platform, descent behind PLE at first very gradual and then moderately steep to posterior border, widest opposite the long median

longitudinal thoracic groove which begins a little less than one third of distance from PLE to posterior border, with a few bristles in region of eyes and behind PLE, very little hair except the whitish lanceolate hair which nearly covers area around eyes except AME.

Eyes. In four distinct rows. Second row wider than first in ratio of 53 : 49, wider than fourth row in ratio of 53 : 40, wider than third in ratio of 53 : 38. Quadrangle of laterals wider than long in ratio of 53 : 32. Total eye space occupies seventeen thirty-ninths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 24 : 9 : 1.75 : 9.5. AME separated from one another by one twenty-fifth of their diameter, from ALE by four twenty-fifths of their diameter. PME closer to ALE than to PLE in ratio of about 3 : 5. Height of clypeus equal to one third the diameter of AME. Clypeus decorated by one long yellowish bristle just beneath outer border of AME and another shorter one much below this, and the usual three long upturned yellowish bristles in the lower angle between AME. A few white lanceolate hairs around ventral part of border of AME.

Chelicerae. Robust, vertical, parallel, gibbous in front, with well developed basal boss; each chelicera with the usual two fairly robust spines on medial dorsal margin overlapping those from opposite side, also a few small dorsal spines near distal end corresponding to those which are usually conspicuous in this position in males; basal segment 1.15 mm. long. Fang fairly robust, curvature somewhat irregular. Fang groove distinct; with three promarginal teeth in medial half; retromargin with six teeth extending from medial end of groove to near base of fang, first small, last largest and others about equal in size.

Maxillae. Parallel, longer than wide in middle in ratio of about 2 : 1, somewhat dilated distally, with well developed scopula along truncature, outer margin only slightly concave in middle, palp inserted into basal third, outer distal corner well rounded, with no tubercle.

Lip. Longer than wide in ratio of 7 : 6, basal excavations reach about one third of length of organ, reaches slightly beyond middle of maxillae. Sternal suture straight.

Sternum. Broadly scutiform, longer than wide in ratio of about 29 : 23, widest between second coxae, but nearly as wide between first and third; moderately convex; anterior border wider than base of lip in ratio of about 13 : 9; posterior end a bluntly rounded lobe slightly extending between fourth coxae which are separated by nine twentieths of their diameter.

Legs. 1423. Tibial index of first leg 10, of fourth leg 11.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.49	1.15	2.69	2.56	.50	9.39
2.	2.18	.98	2.06	2.09	.45	7.76
3.	2.07	.90	1.86	2.11	.57	7.51
4.	1.98	.76	1.98	2.56	.57	7.85

All legs slender, with a small amount of simple hair and no special fringes or tufts.

Spines. First leg: femur dorsal 1–1–1, prolateral and retrolateral 0–1–1, patella 0; tibia prolateral and retrolateral 0–0–1–0, ventral 2–2–2–2 (not terminal); metatarsus only prolateral 1–0–0, ventral 2–2–2. Second leg: as in first except metatarsus prolateral 1–0–0. Third leg: femur as in first; patella only dorsal 0–0–1; tibia dorsal 1–0–1–0, prolateral and retrolateral 0–1–1–0, ventral 0–2–0; metatarsus prolateral 1–0–1, retrolateral 1–1–0; ventral 2–2–comb. Fourth leg: femur only dorsal 1–1–1, retrolateral distal 1; patella as in third; tibia as in third except ventral 0–0–1p (very slender); metatarsus prolateral 0–1–1, retrolateral 0–1–0–0, ventral 0–1p–1r–0–comb. Palpal spines: femur dorsal 0–1–1, prolateral and retrolateral distal 1; patella dorsal 0–0–1, prolateral 0–1–0; tibia only prolateral 1–1; tarsus with a whorl of five long spines near base, two prolateral near distal end, and a short dark terminal spine.

Abdomen. Moderately stout, longer than wide in ratio of 68 : 27, widest nearly one third from base, position of colulus not indicated. Other features essentially the same as in other species of the genus.

Epigynum. Simple and of moderate size; with no posterior marginal notch; two large spermathecae a short distance in front of the posterior margin and about a diameter of one of them apart; anterior border a slightly recurved margin behind which is a transversely depressed area bearing two minute openings (Fig. 5).

Color in alcohol. Nearly unicolorous yellowish-white throughout. Eyes on black spots, but with a patch of white lanceolate hair covering the raised ocular platform. Ungual tufts dark brown on all tarsi.

Type locality. Female holotype from Canal Zone Biological Area, July, 1934. Several paratype females from the same locality as the holotype, June–July, 1934; Ft. Davis, C. Z., Aug., 1936; Madden Dam, C. Z., Aug., 1939. Canal Zone Forest Reserve, C. Z., July–Aug., 1939.

Lyssomanes consimilis Banks, 1929

Mr. Banks ('29) had one male from the Canal Zone Biological Area, July, 1924. There are also three undescribed females with the type male, indicating that these were thought to be the females of the species. I have carefully examined them and have been compelled to decide that they belong elsewhere. The females which I suspect of going with the males of this species are those which I have described as L. parki sp. nov., but I do not feel sufficiently certain to actually unite them. I have numerous examples of *L. consimilis* Banks from the following localities: Canal Zone Biological Area, June–July, 1934; July–Aug., 1936; June–Aug., 1939; Canal Zone Forest Reserve, C. Z., Aug., 1939.

Lyssomanes deinognathus F. Cambridge, 1900

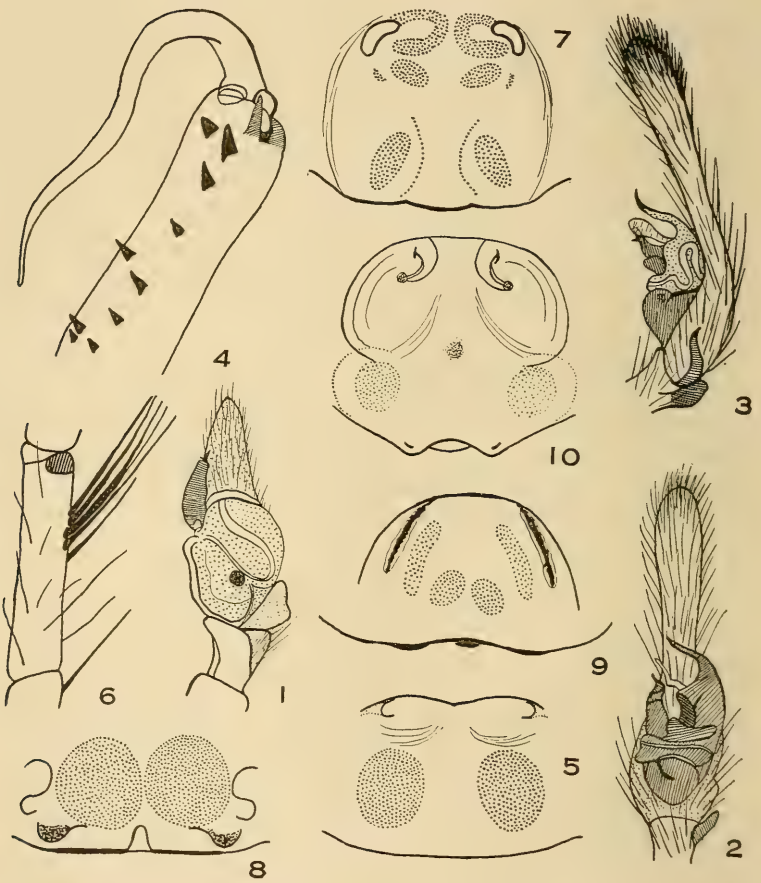
L. deinognathus Petrunkevitch, 1911

One male from Ft. Sherman, C. Z., 1939, which agrees well with Cambridge's excellent figures and his description of this species from Teapa, Mexico. A new record for Panama.

Lyssomanes dissimilis Banks, 1929

Figures 6–7

Mr. Banks ('29) had two mature males, one immature male, and seven mature females. One male was from Ft. Sherman, C. Z., all others were from the Canal Zone Biological Area, July, 1924. I have six specimens, three of each sex, all from the Canal Zone Biological Area in June–July, 1934 and 1936. My notes state that the females had green legs and carapaces when taken. A figure of the epigynum is furnished to bring out some features not shown in the original drawing. This organ lacks a posterior marginal notch; with a pair of slit-like depressions at the anterolateral angles of the epigynal plate (Fig. 7). The fang groove in the female has three promarginal and seven retromarginal teeth. In the male the promargin has three teeth near the medial end of the groove and a short blunt tooth near base of fang; the retromargin has seven teeth, the longest being near base of fang. Since the next to the last pair of tibial spines, counted as ventral by the author of the species, is only slightly offset laterally it may be just as well to continue to regard this as a species with five pairs of ventral tibial spines. The palpal tibia has a cluster of stiff spines a little distal of the middle (Fig. 6).



External Anatomy of Spiders

Fig. 1. *Chinoscopus flavus* (Peckham), male palp, retrolateral view.
Figs. 2–4. *Lyssomanes banksi* Chickering; male palp, ventral and retrolateral view, and left chelicera from below.
Fig. 5 *L. bryantae* Chickering; epigynum, ventral view.
Figs. 6–7. *L. dissimilis* Banks; tibia of male palp and epigynum.
Fig. 8. *L. eatoni* Chickering; epigynum, ventral view.
Fig. 9 *L. montanus* Chickering; epigynum, ventral view.
Fig. 10. *L. parki* Chickering; epigynum, ventral view.

LYSSOMANES EATONI spec. nov.

Figure 8

Female holotype. Total length 5.89 mm. Carapace 2.37 mm. long, 1.60 mm. wide at some distance behind PLE which occupy half the total width of the carapace at their level, 1.41 mm. tall and, therefore, .88 as tall as wide, all eyes except AME on raised ocular platform and somewhat more crowded than usual in the genus, descent quite steep and regular from PLE to posterior border, widest part opposite long median longitudinal thoracic groove which begins about one fourth of the distance from PLE to posterior border, with little hair except the yellowish-white lanceolate hair in ocular region and a few bristles.

Eyes. Eight eyes in four rows. Anterior row wider than second row in ratio of 50 : 37, wider than fourth row in ratio of 50 : 29, wider than third row in ratio of 50 : 19. Quadrangle of laterals about as wide as long. Total eye space occupies sixteen thirty-fifths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 25 : 12 : 2 : 11. AME almost contiguous, separated from ALE by one twelfth of their diameter. PME closer to ALE than to PLE in ratio of about 7 : 11. Height of clypeus equal to seven twenty-fifths of the diameter of AME. Clypeus decorated only with three long upturned yellowish bristles in lower angle between AME.

Chelicerae. Parallel, vertical, moderately robust, basal segment .90 mm. long, quite gibbous in front, with moderately developed basal boss, with usual two spines (rather more slender than usual in the genus) on each chelicera near middle of medial dorsal margin with those from opposite sides overlapping one another, another slender spine just a little distal to the middle in front and a group of very short weak spines near distal end. Fang moderately slender. Fang groove distinct; promargin apparently with four teeth, three close together near medial end of groove and a single one isolated near middle; retromargin with seven teeth increasing regularly in size from the first, with longest interval between third and fourth.

Maxillae. Parallel, longer than wide in middle in ratio of about 2 : 1, moderately dilated distally, outer lateral border almost straight, distal border curved smoothly around outer distal corner which has no tubercle, with scopula moderately developed along truncature.

Lip. Longer than wide in ratio of 6 : 5, anterior border moderately notched in middle, basal excavations reach about one third the length of organ, reaches slightly beyond middle of maxillae. Sternal suture

gently procurved. Whole lip somewhat ridged along posterior surface and moderately excavated laterally.

Sternum. Broadly scutiform, longer than wide in ratio of about 5 : 4, moderately convex, widest between intervals separating second and third coxae, anterior border wider than base of lip in ratio of about 5 : 3, posterior end a rounded lobule which extends about halfway between fourth coxae which are separated by almost half their diameter.

Legs. 1432. Tibial index of first and fourth legs 9.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.62	1.02	2.30	2.05	.56	8.55
2.	2.30	.90	1.92	1.94	.51	7.57
3.	2.24	.72	1.82	2.24	.64	7.66
4.	2.30	.64	2.14	2.75	.64	8.47

All legs slender, with little hair, and no special fringes or tufts.

Spines. First leg: femur dorsal 1–1–1, prolateral and retrolateral 0–1–1; patella 0; tibia prolateral and retrolateral 0–0–1–0, ventral on right 2–2–1p–2 (not terminal) while on left 1p–2–1p–2; matatarsus only ventral on right 1p–0–1p, but on left 2–1p–2. Second leg: one lacking; femur and patella as in first; tibia prolateral and retrolateral as in first, ventral 2–2–1p–2 (not terminal); metatarsus only ventral 2–1p–1p. Third leg: femur as in first; patella only dorsal 0–0–1; tibial scars seem to indicate dorsal 1–0–0–1, prolateral and retrolateral 0–1–1–0, ventral right 0, but left 0–0–1p–0; metatarsus only ventral 2–2–comb. Fourth leg: femur dorsal 1–1–1, prolateral and retrolateral distal 1; patella as in third; tibial scars indicate dorsal 1–0–0–1, retrolateral 0–1–1–0, elsewhere 0; metatarsus apparently only ventral 0–1r–comb. Irregularity in spination seems to be a feature of this species, at least in females. Palpal spines: femur seems to have only two small distal spines (dorsal and retrolateral); patella only dorsal distal 1; tibia only prolateral 1–1; tarsus with a whorl of five near base, two prolateral near distal end, and also either a very slender straight brownish spine or a stiff bristle at tip.

Abdomen. Longer than wide in ratio of 55 : 22, widest near middle, many whitish deposits of guanin beneath surface chitin; position of colulus seems to be indicated by a broad low fold without special hairs. Otherwise as described for other species in the genus.

Epigynum. Posterior margin straight except for an obscure but fairly deep notch; two very large and nearly contiguous spermathecae lying just anterior to margin; at postero-lateral corners is a pair of small openings (Fig. 8).

Color in alcohol. Carapace: yellowish-white with all eyes except AME on black spots, and cephalic ocular platform with whitish lanceolate hairs. Mouth parts and sternum unicolorous yellowish-white. Legs: yellowish-white with small brownish spots; first leg with a retrolateral distal femoral dark spot, tibial retrolateral distal and proximal and prolateral distal dark spots, distal half of tarsus also brown; second leg only with distal half of tarsus dark brown; third and fourth legs only with retrolateral and prolateral distal tarsal dark spots; third and fourth tibiae also with distal and proximal spots on retrolateral and prolateral surfaces.

Type locality. Female holotype from El Valle, R. P., July, 1936. No paratypes.

Lyssomanes elegans F. Cambridge, 1900

L. elegans Petrunkevitch, 1911
L. elegans Petrunkevitch, 1925

F. Cambridge had only females and the males still remain unknown. The identification has to be made from the form of the epigynum, but it is probably correct. A hypotype should be described in detail. One specimen from the Canal Zone Biological Area, July, 1934, and one from Boquete, R. P., July, 1939.

Lyssomanes jemineus Peckham, 1888

L. jemineus Peckham, 1896
L. jemineus F. Cambridge, 1900
L. spinifer F. Cambridge, 1900
L. jemineus Simon, 1901
L. jemineus Petrunkevitch, 1911
L. spinifer Petrunkevitch, 1911
L. jemineus Petrunkevitch, 1925

Only a single male now remains of the type material upon which the species was founded, but the description and the figures should make it possible to identify the females as well as the males. The type male is labelled from Panama by the Peckhams. *L. spinifer* F. Cambridge in the Banks collection from Costa Rica is probably identical with L. jemineus Peckham from Panama. In his comments

concerning *L. spinifer* Cambridge himself seemed to think it probable that these two were the same. I think the evidence is now sufficiently clear to enable us to adopt the synonymy given above. One specimen, a female, from El Valle, R. P., July, 1936, and two females from Boquete, R. P., July, 1939.

Lyssomanes montanus spec. nov.

Figure 9

Female holotype. Total length 6.24 mm. Carapace 2.56 mm. long, 1.85 mm. wide at some distance behind PLE which occupy nineteen thirty-sixths of the total width of the carapace at their level, 1.28 mm. tall and, therefore, .69 as tall as wide; all eyes except AME on a raised cephalic platform; descent from just behind PLE moderately steep to posterior border, the long median longitudinal thoracic groove opposite widest part of carapace; with little hair except in ocular area where the color occurs around eyes, a very few bristles.

Eyes. In four distinct rows. First row only slightly wider than second row; second row wider than fourth row in ratio of 4 : 3, wider than third row in ratio of 52 : 27. Quadrangle of laterals wider than long in ratio of 26 : 25. Total eye space occupies forty-three seventy-sixths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 26 : 15.5 : 2.75 : 15.5. AME barely separated from one another, from ALE by one fifteenth of their diameter. PME closer to ALE than to PLE in ratio of about 2 : 3. Height of clypeus equal to seven twenty-sixths of the diameter of AME. Clypeus decorated with a coat of white appressed lanceolate hairs which often shows a pinkish iridescence, a few slender yellowish bristles along ventral margin, two long slender yellowish bristles beneath each AME, and three long upturned yellowish bristles in lower angle between AME.

Chelicerae. Fairly robust, vertical, mildly divergent, swollen in front near middle, especially near medial border, basal boss well developed, basal segment .94 mm. long. Fang rather slender, somewhat compressed, evenly curved. Fang groove distinct; with three promarginal teeth, all near medial end of groove; retromargin with eight teeth extending from medial end of groove to near base of fang; both rows of teeth increase in size regularly from medial end of groove to base of fang.

Maxillae. Parallel, longer than wide in middle in ratio of 33 : 16, very slightly notched in middle of outer border, outer distal corner well rounded with no tubercle, angle between distal border and outer

lateral border more than ninety degrees, palp inserted into basal third.

Lip. Longer than wide in ratio of 20 : 17, basal excavations reach one third of length of organ, reaches two thirds the length of maxillae. Sternal suture straight.

Sternum. Broadly scutiform, longer than wide in ratio of 53 : 45, widest between second coxae, almost as wide between first and third coxae, anterior border wider than base of lip in ratio of 5 : 3, moderately convex, posterior end bluntly rounded, somewhat extended between fourth coxae which are separated by one half their diameter.

Legs. 1432. Tibial index of first leg 9, of fourth leg 8.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.88	1.20	2.50	2.43	.64	9.65
2.	2.56	.96	2.24	2.06	.64	8.46
3.	2.50	.83	2.11	2.45	.67	8.56
4.	2.50	.71	2.18	2.94	.64	8.97

All legs long and slender, with a moderate amount of simple hair but no fringes or special tufts.

Spines. First leg: femur dorsal 1–1–1, prolateral and retrolateral 0–1–1; patella 0; tibia prolateral and retrolateral 0–0–1–0, ventral 2–2–2–2 (not terminal); metatarsus prolateral and retrolateral 1–0–0, ventral 2–2–2. Second leg as in first. Third leg: femur as in first; patella only dorsal distal 1; tibia dorsal 0–0–1–0, prolateral and retrolateral 0–1–1–0, ventral 0–0–2–0; metatarsus prolateral and retrolateral 1–0–0, ventral 2–2–0. Fourth leg: femur dorsal 1–1–1, prolateral and retrolateral only distal 1; patella as in third; tibia dorsal 0–0–1–0, prolateral and retrolateral 0–0–1–0, ventral 0; metatarsus only ventral 0–1r–0. Palpal spines: femur dorsal 0–0–1–1, prolateral and retrolateral distal 1; tibia only prolateral and retrolateral 1–1; tarsus with a whorl of five near base and two more on prolateral side near distal end, and a very stiff black bristle or a slender spine at tip.

Abdomen. Longer than wide in ratio of 58 : 21, widest about one third from base, integument so transparent that heart shows with great clarity; anal tubercle a short flattened cone, three pairs of spinnerets as described for L. parki sp. nov; position of colulus indicated by black hairs; tracheal spiracle near base of spinnerets, with a distinct lip but no tubercle. Many short recurved bristles all over abdomen, more or less in rows along lateral sides.

Epigynum. Epigynal plate large, moderately swollen, but simple; only a very shallow posterior marginal notch; a pair of spermathecae close together a short distance in front of notch; anterior boundary a broad recurved line; two long curved slits probably mark the position of the openings to interior; these slits often filled with a gummy secretion (Fig. 9).

Color in alcohol. Carapace: yellowish-white with all eyes except AME on black spots; area in center of region of PME and PLE and dorsal to AME covered with white lanceolate hair; many orange-red lanceolate hairs surrounding bases of all eyes except AME. Sternum almost white. Mouth parts yellowish-white. Legs unicolorous light amber above, lighter below. Abdomen: unicolorous yellowish-white. A note indicates the specimens from El Valle were green when alive.

Type locality. Female holotype from Canal Zone Biological Area, July, 1939. Many paratypes from the same locality: June–July, 1934; July–Aug., 1936; June–July, 1939; also El Valle, R. P., July, 1936.

Lyssomanes parki spec. nov.

Figure 10

Female holotype. Total length 7.04 mm. Carapace 2.69 mm. long, 1.85 mm. wide considerably behind PLE which occupy only about one half the total width of carapace at their level, 1.44 mm. tall and, therefore, about .78 as tall as wide, all eyes except AME on elevated cephalic platform, descent moderately steep from shortly behind PLE, widest opposite long median longitudinal thoracic groove which begins nearly one fifth of the distance from PLE to posterior border, with a few bristles in region of eyes and a moderate amount of hair, special areas of which will be noted under color.

Eyes. In four distinct rows. First row as wide as second row; second row wider than fourth row in ratio of 18 : 13, wider than third row in ratio of 9 : 5. Quadrangle of laterals wider than long in ratio of 6 : 5. Total eye space occupies seven thirteenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 27 : 14 : 3 : 14. AME separated from one another by one twenty-seventh of the diameter of AME, from ALE by two twenty-sevenths of their diameter. PME closer to ALE than to PLE in ratio of about 5 : 7. Height of clypeus equal to one third of the diameter of AME. Clypeus decorated by a rich covering of appressed whitish hairs which in certain light has a pinkish iridescence, three long upturned bristles in lower

angle between AME, and a small group of bright red hairs above the three bristles. AME white, all others dark.

Chelicerae. Robust, slightly divergent, rounded in front, with two long erect spines on each chelicera arising about one third from base and overlapping one another medially; also two other erect spines on each chelicera extending forward from about the middle of front surface. Fang strongly chitinized; of moderate size; somewhat constricted about two fifths from base, somewhat irregular but hardly sinuous. Fang groove distinct; with three promarginal teeth near medial end, the innermost small; with seven retromarginal teeth, the innermost very small, others of moderate size but increasing regularly toward base of fang.

Maxillae. Parallel, longer than wide in middle in ratio of 33 : 15, considerably dilated distally, hardly notched at all in middle of outer border, outer distal corner well rounded and with border continuous with anterior margin, palp inserted into basal third.

Lip. Longer than wide in ratio of 20 : 17, basal excavations reach one third of length of organ, reaches nearly two thirds the length of maxillae, nearly rectangular in shape. Sternal suture gently procurved.

Sternum. Broadly scutiform, longer than wide in ratio of 19 : 16, widest between second coxae but nearly as wide between first and third, anterior border wider than base of lip in ratio 25 : 17, moderately convex, posterior end bluntly rounded, extends slightly between fourth coxae which are separated by one third of their diameter.

Legs. 1423. Tibial index of first leg 8, of fourth leg 9.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	3.01	1.15	2.75	2.77	.60	10.28
2.	2.54	.95	2.24	2.30	.58	8.61
3.	2.37	.83	2.11	2.40	.58	8.29
4.	2.43	.70	2.24	2.75	.60	8.72

All legs slender, with a moderate amount of hair, but without special fringes or tufts; spiny.

Spines. Nearly all spines are long and at least fairly robust. First leg: femur dorsal 1–1–1, prolateral and retrolateral 0–0–1–1, ventral 0; patella only dorsal 0–0–1; tibia dorsal 0–0–1–0, prolateral and retrolateral 0–0–1–0, ventral 2–2–2–2 (not terminal); metatarsus prolateral and retrolateral 1–0–0, ventral 2–2–2–0. Second leg: same as first. Third leg: femur and patella as in first and second; tibia

dorsal 1–0–1–0, prolateral and retrolateral 0–1–1–0, ventral 0–1r–1p–1p; metatarsus prolateral 1–0–0–1, retrolateral 1–0–0–0, ventral 2–2–0–1r. Fourth leg: femur as in others except retrolateral only distal 1; patella as in others; tibia as in third except ventral 0–0–1r–0, metatarsus prolateral 1–0–0–0, retrolateral 0–1–1, ventral 0. Palpal spines: femur dorsal 1–1–1, prolateral and retrolateral distal 1; patella prolateral 0–1–0, and dorsal distal 1; tibia prolateral 1–1, tarsus with a whorl of four near proximal end.

Abdomen. Nearly cylindrical in general form, longer than wide in ratio of about 3 : 1; anal tubercle a short flattened cone; three pairs of spinnerets short and inconspicuous, with middle pair small and hidden; position of colulus indicated by three or four black hairs; tracheal spiracle near base of spinnerets, with distinct lip but no tubercle.

Epigynum. Epigynal plate fairly large; with a posterior marginal notch; central part of plate swollen, with a pair of spermathecae far apart near lateral margins; anterior half of plate with a pair of fairly large shallow depressions, bounded anteriorly by a recurved border (Fig. 10).

Color in alcohol. Carapace: yellowish-white with all eyes except AME on black spots; medial to ALE, between ALE and PLE, and between PLE are many fiery-red lanceolate hairs; in center of interocular area and ventral to all eyes except AME are white lanceolate hairs. Mouth parts yellowish-white. Legs: yellowish-white except for a very few gray spots, the most important of which are on retrolateral surface of first patellae, and prolateral and retrolateral of first and fourth tibiae near distal ends. Abdomen: yellowish-white with a pair of small dorsal gray spots near middle and another pair of dorsal gray spots elongated to extend through the last quarter.

Type locality. Female holotype from Canal Zone Biological Area, July, 1936; Eight female paratypes from same locality: June–July, 1934; Aug., 1936; June, 1939.

Lyssomanes patens Peckham, 1896

L. patens F. Cambridge, 1900
L. trifurcatus F. Cambridge, 1900
L. patens Petrunkevitch, 1911
L. trifurcatus Petrunkevitch, 1911
L. patens Petrunkevitch, 1925
L. trifurcatus Petrunkevitch, 1925

A careful study of Peckham's types with a comparison with my example has convinced me that all belong to the same species. Cambridge himself had doubts about the distinctions between his *trifurcatus* and the Peckhams' *patens*. His decision seems to have depended upon his interpretation of Emerton's drawings of the male in which little if any clypeus is shown. The clypeus is present as usual and its width is equal, in the type male, to about seven twenty-fifths of the diameter of AME. There may be more doubt concerning the identity of the females but, even here, I think when material is available it will be found that the females also belong to the same species. My collection includes but one mature male and no females, Canal Zone Biological Area, June, 1939.

Lyssomanes shropshirei spec. nov.

Figure 11

Female holotype. Total length 6.14 mm. Carapace 2.37 mm. long, 1.84 mm. wide at some distance behind PLE which occupy twenty-three fifty-thirds of total width of carapace at their level, 1.41 mm. tall and, therefore, about .77 as tall as wide, all eyes except AME on a moderately raised cephalic platform, descent quite steep from just behind PLE to posterior border, widest opposite interval between second and third coxae; with a long median longitudinal thoracic groove beginning about one fifth of the distance from PLE to posterior border, with very little hair except in ocular area where color is located; only few bristles.

Eyes. In four distinct rows. First and second rows equal in length; second row wider than fourth row in ratio of 25 : 17, wider than third row in ratio of 5 : 3. Quadrangle of laterals wider in front than long in ratio of about 5 : 4. Total eye space occupies one half the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 24 : 12 : 2 : 11. AME separated from one another by one twenty-fourth of their diameter, from ALE by one tenth of their diameter. PME closer to ALE than to PLE in ratio of 8 : 13. Height of clypeus equal to five twelfths the diameter of AME. Clypeus decorated with a rich and somewhat iridescent coat of yellowish-white appressed lanceolate hairs, and three yellowish bristles upturned, but not as long as usual, in the lower angle between AME.

Chelicerae. Robust, slightly porrect, somewhat divergent from bases, strongly rounded, full in middle, with well developed basal boss, basal segment .90 mm. long, each chelicera with the usual pair

of long spines arising from medial dorsal margin near middle and overlapping those from opposite side, also several smaller spines from the medial surface of each chelicera in distal half and a group of smaller spines on dorsal surface in distal half. Fang moderately robust, somewhat constricted about two fifths from base, otherwise smoothly curved. Fang groove distinct; promargin with three teeth, all in medial half, two close together, the other and largest tooth somewhat isolated; retromargin with six teeth on left and seven on right occupying the whole margin, the largest near base of fang.

Maxillae. Slightly divergent, somewhat dilated distally, longer than wide in middle in ratio of about 2 : 1, only slightly concave along middle of outer border, with well developed scopula along truncature, outer distal corner well rounded, without tubercle; palp inserted into basal third.

Lip. Longer than wide in ratio of 21 : 17, basal excavations barely reach one third of its length, reaches nearly three fifths the length of maxillae, slightly notched distally. Sternal suture straight.

Sternum. Broadly scutiform, widest at interval between second and third coxae, longer than wide in ratio of 27 : 24, anterior border wider than base of lip in ratio of 13 : 8, moderately convex, posterior end a blunt rounded lobe extending about halfway between fourth coxae which are separated by about seven seventeenths of their diameter. All coxae of moderate length.

Legs. 1423. Tibial index of first and fourth legs 9.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.66	1.09	2.37	2.24	.58	8.94
2.	2.24	.90	1.88	1.92	.58	7.52
3.	2.21	.83	1.66	1.98	.58	7.26
4.	2.24	.75	1.84	2.24	.58	7.65

All legs fairly slender, with few hairs and without fringes or special tufts.

Spines. First leg: femur dorsal 1–1–1, prolateral and retrolateral 0–1–1; patella 0, but with a long slender dorsal distal bristle; tibia prolateral 0–0–1–0, retrolateral 1 (weak)–0–1–0, ventral 2–2–2–2 (not terminal); metatarsus prolateral and retrolateral 1–0–0, ventral 2–2–2 (not terminal). Second leg: femur and patella as in first; tibia and metatarsus as in first except tibial retrolateral 0–0–1–0. Third leg: femur as in first; patella only dorsal 0–0–1; tibia dorsal 1–0–1–0, prolateral and retrolateral 0–1–0–1–0, ventral 0–0–2–0; metatarsus

prolateral 1–0–1, retrolateral 1–0–0, ventral 2–2–0. Fourth leg: femur as in first except retrolateral only distal 1; patella as in third; tibia as in third except ventral 0; metatarsus prolateral and retrolateral 1–0–0, ventral 0–2–comb. Palpal spines: femur dorsal 0–1–1, prolateral and retrolateral distal 1; patella only one long dorsal distal; tibia only prolateral 1–1; tarsus with a whorl of four near base, two or three weak prolaterals near distal end, and the usual dark brown stiff terminal bristle or weak spine.

Abdomen. Longer than wide in ratio of 12 : 5, widest about five twelfths from base, fairly broad at base and tapered nearly to a point at posterior end, dorsal and lateral surfaces with numerous short stiff bristles directed backward, position of vestigial colulus indicated by two hairs, other features essentially as described for other species in the genus.

Epigynum. Simple; a shallow small posterior marginal notch has a chamber dorsal to it; two large, somewhat obliquely placed spermathecae in posterior half of plate; a pair of circular areas about a diameter of one of them apart, each with what appears to be a small opening in its center (Fig. 11).

Color in alcohol. Generally yellowish-white; with all eyes except AME on black spots; area bounded by PME and PLE is whitish due to presence of lanceolate hairs and the region just outside of ALE and PLE is also whitish; region between AME and ALE, behind PLE and between ALE and PLE covered with deep red lanceolate hairs. Mouth parts and sternum yellowish-white. Legs generally yellowish with ungual tufts brownish and first pair of tibiae with a small prolateral distal and retrolateral distal brownish spot. Abdomen: unicolorous yellowish-white except for a pair of small dorsolateral grayish spots near posterior end.

Type locality. Female holotype from Canal Zone Biological Area, July, 1934. Three paratypes from Canal Zone Biological Area, June, 1939 and Ft. Sherman, C. Z., August, 1939.

Lyssomanes zeteki spec. nov.

Figures 12–15

Male holotype. Total length 5.10 mm. Carapace 1.92 mm. long, 1.60 mm. wide at some distance behind PLE which occupy eleven twenty-thirds of the total width of the carapace at their level, 1.08 mm. tall and, therefore, .60 as tall as wide (relatively low because of unusual width), all eyes except AME on a moderately raised cephalic platform

with PME on a small secondary tubercle, descent behind PLE at first moderately steep and then in region of thoracic groove much steeper to posterior border, ventral margin almost circular from below ALE, with widest place opposite interval between second and third coxae, long median longitudinal thoracic groove begins a little more than one third of the distance from PLE to posterior border, with very little hair except in ocular region and few bristles.

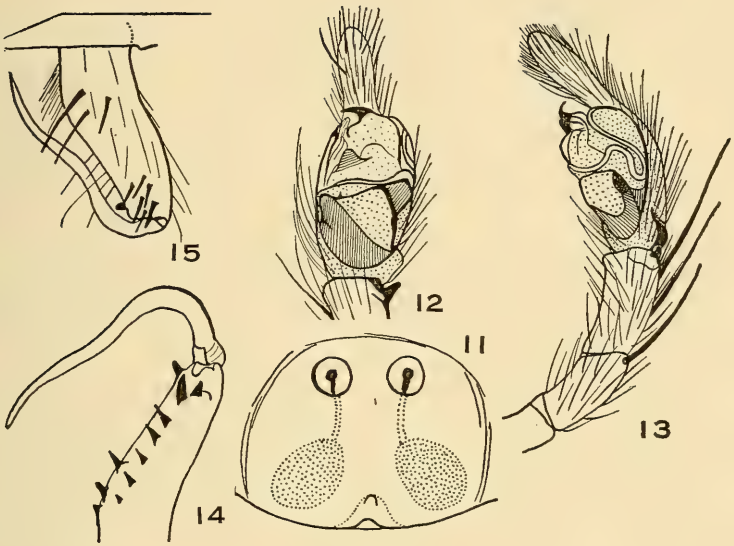
Eyes. Eight eyes in four distinct rows. Second row wider than first row in ratio of 43 : 40, wider than fourth row in ratio of 43 : 32, wider than third row in ratio of 43 : 28. Quadrangle of laterals wider than long in ratio of 43 : 30. Total eye space occupies twenty-one forty-fifths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 20 : 9 : 2 : 8. AME almost contiguous with one another, separated from ALE by one tenth their diameter. PME closer to ALE than to PLE in ratio of 4 : 5. Height of clypeus equal to seven twentieths of the diameter of AME. Clypeus decorated only with the usual three long upturned yellowish bristles in lower angle between AME.

Chelicerae. Strongly produced, fairly robust, only moderately porrect, strongly divergent from basal third, basal boss moderately well developed, with basal segment 1.02 mm. long, each chelicera with the usual two long slender spines extending from medial margin of front surface and overlapping those of opposite side, another weak spine near middle of front surface, and a group of six short distal dorsal spines (Fig. 15). Fang slender, very sinuous. Fang groove distinct; promargin with three teeth near medial end, the first which is very small and difficult to see, and lastly a short blunt tooth near base of fang, thus making four altogether; retromargin with a row of five teeth beginning with a very small one and extending with gradual increase in size to last one about one fifth from base of fang where there is a group of two fairly robust teeth and a low broad tubercle or ridge (Fig. 14).

Maxillae. Parallel, somewhat dilated distally, longer than wide in middle in ratio of about 24 : 13, outer lateral border only slightly concave in middle, outer distal corner well rounded, without tubercle, well developed scopula along truncature. Palp inserted into basal third.

Lip. Only slightly longer than wide, basal excavations reach about one third the length of the organ, reaches to about the middle of maxillae. Sternal suture straight.

Sternum. Broadly scutiform, longer than wide in ratio of 42 : 39,



External anatomy of Spiders

Fig. 11. *Lyssomanes shropshirei* Chickering; epigynum, ventral view.
Figs. 12–13. *L. zeteki* Chickering; male palp, ventral and retrolateral view.
Figs. 14–15. *L. zeteki* Chickering; chelicera from below and from in front.

equally wide between second and third coxae, moderately convex, especially between third coxae, anterior border wider than base of lip in ratio of 4 : 3, posterior end a bluntly rounded lobe extended about halfway between fourth coxae which are separated by two thirds their diameter.

Legs. 1423. Tibial index of first and fourth legs 9.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.36	.83	1.98	2.04	.44	7.65
2.	1.95	.75	1.58	1.72	.41	6.41
3.	1.98	.69	1.47	1.79	.44	6.37
4.	2.06	.63	1.53	1.98	.44	6.64
Palp	1.15	.39	.42	—	1.10	3.05

All legs slender, with little hair, and no special fringes or tufts.

Spines. First leg: femur dorsal 1–1–1, prolateral and retrolateral 0–1–1; patella 0, with a distal dorsal bristle; tibia prolateral and retrolateral 0–1–1–0, ventral 2–2–2 (not terminal); metatarsus only prolateral 1–0–0 (lacking on left), and ventral 2–2–2. Second leg: same as first. Third leg: femur as in first; patella only dorsal 0–0–1; tibia dorsal 1–0–1–0, prolateral and retrolateral 0–1–1–0, ventral 0; metatarsus prolateral 1–1–1, retrolateral 1–1–0, ventral 2–0–0. Fourth leg: femur dorsal 1–1–1, prolateral and retrolateral distal 1; patella as in third; tibia as in third; metatarsus only prolateral 0–1–0–0. Palpal spines: femur dorsal 0–1–1, prolateral 1 weak distal; patella dorsal 0–0–1 (long, slender); tibia dorsal 1–1.

Palp. Femur nearly straight; patella and tibia of moderate length with latter only a little longer than former; tibia only with two long slender prolateral spines, no tuft of bristles; tibial retrolateral apophysis a very short spur; cymbium of moderate length for the genus, modified at basal retrolateral angle contiguous to tibial spur; bulb with only two prominent processes, an embolus ending in a short straight spine, and a conductor ending in a short stout spine directed transversely. The delicate membranous process apparently characteristic of all Panamanian Lyssomanes is a short flattened structure between the two prominent processes (Figs. 12–13).

Abdomen. Somewhat damaged; rather slender, longer than wide in ratio of about 3 : 1, probably widest about one third from base, anal tubercle a rather prominent broad cone; position of vestigial colulus not indicated; other features essentially as described for other species of the genus.

Color in alcohol. Carapace: generally yellowish-white with all eyes except AME on black spots; a narrow marginal stripe on each side from postero-lateral corners to just in front of PLE; a narrow grayish central dorsal stripe from just behind PLE, the dorsal end of which is light reddish-brown; a few bright orange-red lanceolate hairs around all eyes except AME. Beneath each AME is a large light reddish-brown spot which is the proximal end of a similarly colored stripe which extends the length of the chelicerae. Elsewhere chelicerae and other mouth parts yellowish white except the reddish brown palpal tarsi. Sternum and legs unicolorous yellowish white except the dark brown ungual tufts. Abdomen: two dorsolateral grayish stripes of moderate width extend from base nearly to posterior end; elsewhere yellowish white, except posterior pair of spinnerets which are grayish along outer lateral surfaces.

Type locality. Male holotype from Canal Zone Biological Area. Taken from Berlese funnel sometime between July, 1943 and March, 1944 by Dr. James Zetek in whose honor the species is named.

SALTICINAE

For the purposes of this study it is believed that all of the genera now known from Panama may be conveniently placed in the following groups: Marpissa group; Itata group; Rudra group; Thiodina group; Phiale group; Jollas group; Metaphidippus group; Amycus group; Zygoballus group; Peckhamia group; Zuniga group; Sarinda group.

Key to the groups of Salticinae

1. Not ant-like; without a distinct pedicel, clearly seen from above.....2
1. Distinctly ant-like; with a distinct pedicel, clearly seen from above....10
2. Total eye space occupies not more than one half total length of carapace; tibial ventral spines usually three pairs, but sometimes fewer; ventral tibial spines always somewhat removed from proximal end of segment, especially along promargin, frequently crowded into distal half; females usually with a distinct posterior marginal notch in epigynal plate; carapace usually of moderate height but sometimes low, usually with gradual descent behind PLE; retromargin of fang groove with a single simple tooth or a single fissidentate tooth; abdomen usually ovoid, moderately stout, sometimes elongated and slightly flattened (Ashtabula, Atelurius, Avitus, Beata, Cheliferoides, Donaldius, Habronattus, Metaphidippus, Parahentzia, Paraphidippus, Parnaenus).....
Metaphidippus group, (p. 246)
2. Not with combination of characters given above.....3

3. Total eye space occupies more than half the total length of carapace; tibial ventral spines usually three pairs but may be fewer; ventral tibial spines usually somewhat removed from proximal end, especially on promargin; females usually with a posterior marginal notch in epigynal plate but often obscure; carapace usually high, but sometimes only moderately so; carapace usually precipitous behind PLE, but sometimes only moderately so; retromargin with a single simple tooth or a fissidentate tooth with or without additional modifications; abdomen ovoid (Bryantella, Cylistella, Dryphias, Orvilleus, Zygoballus) ..... *Zygoballus group*, (p. 389)

3. Not with combination of characters given above 4

4. Total eye space usually occupies about half total length of carapace, but frequently occupies considerably less and sometimes more than half; PME either about equidistant from ALE and PLE or closer to ALE, or in Gorgasella closer to PLE; first leg never notably enlarged; legs often with conspicuous fringes; first tibia with ventral spines not significantly crowded toward distal end of segment; ventral tibial spines usually three pairs, four in Gorgasella; retromargin of fang groove usually with a single simple tooth, but sometimes with a single fissidentate tooth; sternum scutiform, not strongly narrowed between first coxae; carapace always moderately high and at least moderately broad; abdomen ovoid; body often with bright colors (Chapoda, Chira, Compsodecta, Corythalia, Freya, Gorgasella, Monaga, Phiale, Plexippus, Sidusa) ..... *Phiale group*[1], (p. 111)

4. Not with combination of characters given above 5

5. Total eye space occupies half or more than half the length of carapace; PME equidistant from ALE and PLE, closer to ALE, or sometimes closer to PLE; first leg not enlarged, with or without fringes; first tibiae with ventral spines not crowded toward distal ends; retromargin of fang groove with two or more teeth, or, sometimes, with a fissidentate tooth (some females); sternum scutiform, usually broad between first coxae; carapace high and relatively short, with posterior declivity steep but not precipitous as in Zygoballus group (Amycus, Cobanus, Titanattus) ..... *Amycus group*, (p. 346)

5. Not with combination of characters given above 6

6. Total eye space occupies either a little more or a little less than half the length of the carapace; PME usually closer to ALE than to PLE, but rarely closer to PLE; first leg often somewhat enlarged, frequently with fringes; first tibiae with ventral spines reduced in number and often also in size, often with bulbous sensory hairs (Cotinusa, Thiodina, Banksetosa); retromargin of fang groove usually with two or more teeth, but some-

[1] The genera Capidava and Pensacola have not appeared in my collection but they should have been included in my list of genera in the Phiale Group. Each genus is represented in Panama by at least one species.

times with only a single tooth; sternum usually broad, scutiform, sometimes much narrowed between first coxae, quite convex, sometimes raised into a platform; carapace usually moderately low and broad, sometimes low and elongated; abdomen usually slender, cylindriform, but sometimes ovoid (Albionella, Banksetosa, Carabella, Cotinusa, Psecas, Scopocira, Thiodina, Toloella) ..... *Thiodina group*[1], (p. 73)

6. Not with combination of characters given above 7
7. Total eye space occupies half or less than half the length of the carapace; PME closer to ALE than to PLE; first pair of legs more or less enlarged, without fringes; first tibiae either with well developed ventral spines somewhat crowded toward distal end or well spread over the segment; retromargin of fang groove always with a fissidentate tooth; sternum broad, widest between second or third coxae, moderately convex, only moderately narrowed between first coxae; carapace moderately low to low; abdomen either ovoid or moderately elongate, only slightly flattened (Balmaceda, Mabellina, Rudra) ..... *Rudra group*, (p. 57)
7. Not with combination of characters given above 8
8. Total eye space occupies slightly less than half the length of the carapace; PME about midway between ALE and PLE; first pair of legs usually somewhat enlarged, often with fringes; first tibiae either with well developed ventral spines or with these reduced in number and size; retromargin of fang groove with a single simple tooth; sternum fairly broad, widest between second or third coxae, usually much narrowed between first coxae; carapace moderately broad to broad, moderately low to low; abdomen slightly elongated, with some tendency toward flattening. (Breda, Marpissa, Menemerus, Parkella) ..... *Marpissa group*, (p. 36)
8. Not with combination of characters given above 9
9. Total eye space occupies less than half the length of carapace; PME nearer to ALE than to PLE; first pair of legs with at least femora enlarged, often with well developed fringes; legs either with well developed spines or with spines almost totally lacking; retromargin of fang groove with a single simple tooth; sternum either long and narrow or fairly broad; carapace low, long and narrow or low and broad at level of PLE; abdomen long and slender (Itata, Mica) ... *Itata group*, (p. 54)
9. Total eye space occupies about half or more than half the length of carapace; PME closer to PLE than to ALE; first pair of legs not notably enlarged, without fringes; first pair of tibiae with three pairs of ventral spines, but more or less reduction of number of spines especially on posterior two pairs of legs; retromargin of fang groove without teeth; sternum broadly scutiform, fairly wide between first coxae; carapace moderately high and relatively broad; abdomen ovoid (Jollas) ..... *Jollas group*, (p. 241)
10. Retromargin of fang groove with a single fissidentate tooth; abdomen

[1] The genus Colonus was inadvertently omitted from the list of genera in the Thiodina Group. The genus is at present represented in Panama by *Colonus crucifer* F. Cambridge.

moderately stout; neither carapace nor abdomen deeply constricted (Peckhamia, Uluella) ..... *Peckhamia group*, (p. 414)

10. Not with combination of characters given above 11

11. Retromargin of fang groove usually with a single simple tooth, but sometimes with a fissidentate tooth; abdomen ovoid with not more than a slight constriction; carapace narrow and much rounded dorsally behind PLE or much shorter and broader behind PLE (Chirothecia, Descanso, Donatinus, Sebastira, Zuniga) ..... *Zuniga group*, (p. 425)

11. Retromargin of fang groove with two or more small teeth (Paradamoetas has only one); abdomen either ovoid with not more than a shallow constriction, or elongated with a deep constriction; carapace either relatively short with little constriction, or long and narrow with deep constriction (Erica, Fluda, Myrmarachne, Paradamoetas, Parafluda, Sarinda, Simonella) ..... *Sarinda group*, (p. 453)

MARPISSA GROUP

Key to the genera of the Marpissa Group

1. Generally very hairy; with clusters of long curved black bristles beneath and behind PME; anterior row of eyes wider than posterior row which occupy about three fifths of width of the very broad carapace; total eye space occupies much less than one half the length of carapace; leg spines numerous, long ..... *Marpissa*, (p. 44)

1. Not with combination of characters given above 2

2. Moderately hairy; with long curved black bristles in ocular area, not in clusters; anterior row of eyes about as wide as posterior row which occupy about five sixths of width of carapace which is not much broadened and has nearly parallel sides; total eye space occupies a little more than two fifths of length of carapace; leg spines somewhat reduced ..... *Menemerus*, (p. 48)

2. Not with combination of characters given above 3

3. Not notably hairy, often with little hair on carapace; long black bristles in ocular area not especially prominent; anterior row of eyes as wide as posterior row which occupy about three fourths of width of carapace which is not much broadened and is gently rounded laterally; total eye space occupies from two fifths to about one half the length of carapace; leg spines definitely reduced in size and number, often only cusps ..... *Breda*, (p. 37)

3. Almost devoid of hair; without long curved black bristles in ocular area; posterior row of eyes slightly wider than anterior row; PLE occupy nearly full width of carapace which is considerably broadened and gently rounded laterally; total eye space occupies about one half the length of carapace; leg spines moderately reduced in number and size.. *Parkella*, (p. 48)

Genus Breda Peckham, 1894

Key to the species of Breda from Panama

1. A large species, 10–15 mm. long; with a broad bright colored median dorsal abdominal stripe, broadened in posterior half. *B. milvina*, (p. 37)
1. Much smaller species; without any broad bright colored median stripe..2
2. With a less distinctly outlined median lighter colored dorsal abdominal stripe extending from base to a narrow light colored transverse band; with posterior third of abdomen black.....*B. notata*, (p. 39)
2. Without any median dorsal abdominal stripe; with a pair of dorsal yellowish-white abdominal spots near middle followed by a pair of yellowish-white bars behind which is a more or less complete narrow yellowish-white band; with posterior end of abdomen black..*B. punctata*, (p. 44)

Breda milvina (C. Koch), 1846

Figures 16–19

Marpissa milvina C. Koch, 1846
B. milvina peckham, 1894
B. milvina Simon, 1901
B. milvina Petrunkevitch, 1911
B. milvina Petrunkevitch, 1925

The two specimens from Santarem, Brazil in the Peckham collection labelled *B. milvina* (C. Koch) are entirely different from the species now generally conceded to be this species. Petrunkevitch ('25) gave a full description of the female from Panama, together with a good figure of the epigynum. Koch's original description was based upon a female. So far as I know, the description of the male has never been published. I have, therefore, selected a specimen and herewith describe it as the allotype.

Allotype male. Total length 10.56 mm. Carapace 4.61 mm. long, 3.07 mm. wide near middle, lateral margins gently rounded from ALE to posterior border, third row of eyes occupy nineteen twenty-fourths of width of carapace at their level; a shallow median depression just behind third row of eyes within which lies a well defined longitudinal thoracic groove (deeply covered with white hair); surface finely rugulose, about two thirds as tall as wide, with essentially the same form as in female.

Eyes. Seen from in front, anterior row recurved with dorsal margin of ALE only slightly above that of AME. Anterior row only slightly wider than posterior row; middle row slightly narrower than posterior row. Quadrangle of laterals wider than long in ratio of 37 : 25. Total

eye space occupies about three sevenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 36 : 17.5 : 5.5 : 16. AME separated from one another by about one ninth of their diameter, from ALE by about two ninths of their diameter. Middle eyes nearly equidistant from ALE and PLE. Height of clypeus equal to seven thirty-sixths of diameter of AME. Clypeus with a scanty fringe of white hairs along ventral margin.

Chelicerae. Parallel, vertical, normal in appearance, no boss visible, front surface transversely rugulose. Fang of moderate size, evenly curved. Fang groove well defined, with a prominent, strongly chitinized, promarginal ridge upon which are placed four small teeth; with a single small tooth on retromargin at end of basal third of fang groove (Fig. 16).

Maxillae, Lip, and Sternum. Essentially as described in the female by Petrunkevitch ('25).

Legs. 1423. Tibial index of first leg 14, of fourth leg 10.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	3.20	2.18	2.56	1.98	1.15	11.07
2.	2.58	1.66	1.98	1.47	1.08	8.77
3.	2.43	1.28	1.73	1.73	1.02	8.19
4.	2.96	1.47	2.62	2.11	1.08	10.24
Palp	1.22	.51	.60	—	1.09	3.42

First leg not as much thickened as in female, especially the femur. Otherwise essentially as in female.

Spines. Quite different from those described by Petrunkevitch ('25) in the female. First leg: femur as in female except ventral 0–0–1p; patella 0; tibia with eight cusps on ventral surface arranged as shown in Figure 17. An examination of paratypes shows that there is a wide variation in number and placement of the ventral tibial cusps; first metatarsus as in female. Second leg: femur dorsal 1–1–1, prolateral 0–1–1–2, retrolateral 0, ventral 0–0–1p; patella 0; tibia only ventral six irregularly placed (also disconcertingly variable in number and placement even on right and left sides) (Fig. 18); metatarsus as in female. Third leg: femur as in second; patella 0; tibia dorsal 0; prolateral 1–1–0, retrolateral 1–1–1, ventral 2–1p–2; metatarsus dorsal 0, prolateral and retrolateral 0–2, ventral 0–2–2 as in female. Fourth leg: femur dorsal 1–1–1, prolateral 0–0–1–1, retrolateral 0–0–0–1; patella 0; tibia only retrolateral 1–1–1, ventral 2–1r–1p–2; metatarsus apparently as in third. Palp only with femur dorsal 0–0–2.

Palp. Patella short, body also short and broad but extended dorsally so it may be considered to be considerably longer than patella; retrolateral tibial apophysis very long, reaching nearly to middle of tarsus; tarsus broad in middle, deeply excavated basally on ventral side, with a long embolus which originates at base and curves around more than one half the periphery of bulb (Fig. 19). The palp bears a close resemblance to the palps of certain species of Balmaceda like B. modesta (Tacz.).

Abdomen. Somewhat more slender than in female; with a small anterior dorsal chitinized shield. Otherwise essentially as in female.

Type locality. Male allotype from Canal Zone Biological Area, August, 1939. A fairly common species; frequently found among dead palm leaves. Numerous males and females from Canal Zone Biological Area, June-July, 1934; August, 1936; June-August, 1939; Fort Sherman, C. Z., August, 1939.

Breda notata spec. nov.

Figures 20–22

The characters of the carapace, position of the eyes, reduction of ventral spines on legs, and characters of both palps and epigynum place this species in the genus Breda.

Male holotype. Total length 5.82 mm. Carapace 2.88 mm. long, 1.86 mm. wide a short distance behind PLE which occupy about six sevenths of the width of the carapace at their level, 1.02 mm. tall and, therefore, about five ninths as tall as wide; cephalic part rises very slightly to PLE, then descends very gently to steep posterior declivity which lies in the last two fifths of the distance from PLE. A short median longitudinal thoracic groove begins opposite posterior border of PLE.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one sixth of the diameter of ALE. Anterior row only slightly wider than posterior row. Quadrangle of laterals wider than long in ratio of 25 : 17. Total eye space occupies about five elevenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 25 : 11 : 4.5 : 11. AME separated from one another by about one tenth of their diameter, from ALE by about one twentieth of their diameter. Middle eyes only slightly closer to ALE than to PLE. Height of clypeus about one sixth of the diameter of AME. Clypeus decorated only by a ventral fringe of

white simple hairs, a transverse row of six or seven long light colored bristles, and the usual three bristles in lower angle between AME.

Chelicerae. Vertical, parallel, rather small, basal segment .70 mm. long, covered with a few simple white hairs on prolateral surface, transversely rugulose, promargin with three small teeth close together near medial end of groove, retromargin with a single small tooth about one third of distance toward base of fang from medial end.

Maxillae. Parallel, longer than wide in middle in ratio of about 30 : 13, outer border moderately notched, outer distal angle well rounded with no tubercle or hook.

Lip. As wide as long, basal excavations reach two fifths of length of organ, reaches less than one half the length of maxillae. Sternal suture straight.

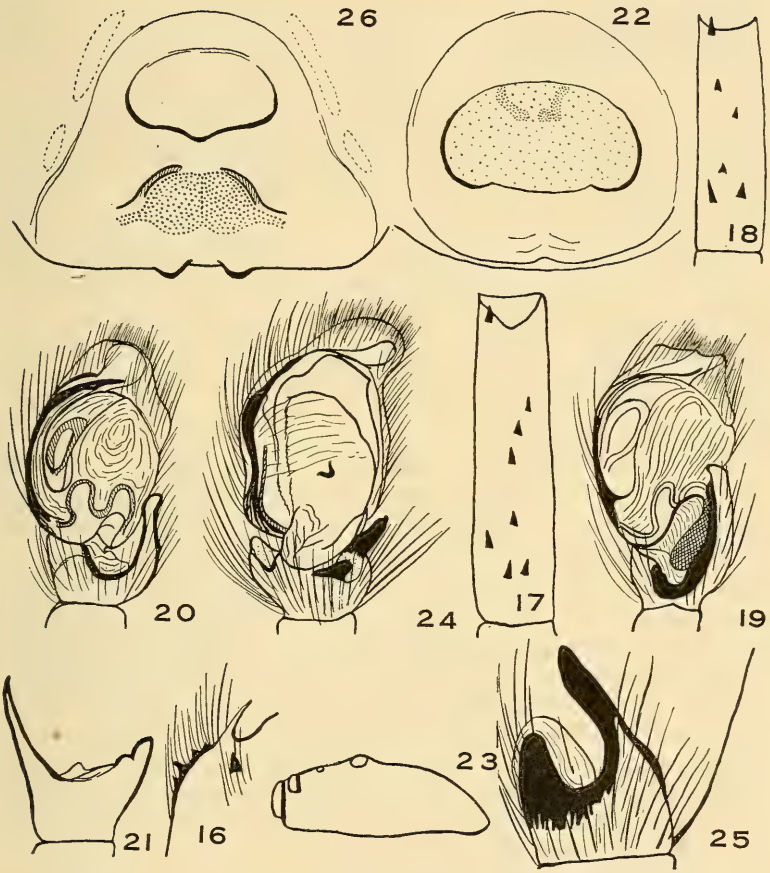
Sternum. Longer than wide in ratio of 55 : 37, widest opposite interval between second and third coxae, very blunt at posterior end which does not extend between fourth coxae which are separated by about one fourth of their diameter.

Legs. 4123. Tibial index of first leg 16, of fourth leg 10.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.66	1.02	1.41	.96	.64	5.69
2.	1.34	.83	1.02	.78	.58	4.55
3.	1.26	.74	.90	1.00	.58	4.48
4.	1.85	.85	1.53	1.28	.58	6.09
Palp	.71	.33	.39	—	.75	2.18

First pair the stoutest. First pair of patellae and tibiae with considerable black hair and what seems to be a remnant of a ventral fringe.

Spines. First leg: femur only dorsal 0–0–1–1–1–0 and prolateral distal 2; patella 0; tibia only one small ventral promarginal near distal end (paratypes frequently show a pair of these, hardly more than cusps); metatarsus only ventral 2–2 (also mere cusps). Second leg: femur as in first except prolateral distal 1; patella 0; tibia only ventral 0–0–1p–1p (a paratype shows none at all); metatarsus only ventral 1r–2 (all mere cusps). Third leg: femur dorsal 0–0–1–1–1, prolateral 0–0–1–2 (close together), retrolateral distal 1 (lacking on left side); patella 0; tibia only prolateral 0–0–1, ventral 0–1p–1p on left side and 0–0–1r on right side; metatarsus prolateral 0–2, ventral 0–2, retrolateral 0–1. Fourth leg: femur dorsal 0–1–1–1, retrolateral distal 1; patella 0; tibia prolateral 0–0–1, ventral 1p–0–2 on left side, 1p–1p–1p



External Anatomy of Spiders

Fig. 16. *Breda milvina*, male cheliceral teeth.
Figs. 17–19. *B. milvina*, first and second tibia, and male palp, ventral views.
Figs. 20–21. *Breda notata* Chickering; male palp, ventral view; palpal tibia, retrolateral view, larger scale.
Fig. 22. *B. notata* Chickering; epigynum, ventral view.
Fig. 23. *Marpissa magna* ,male carapace, lateral view.
Figs. 24–25. *M. magna*, male palp, ventral view; palpal tibia, retrolateral view.
Fig. 26. *M. magna*, epigynum, ventral view.

on right, retrolateral 0–0–1–0; metatarsus as in third. Palpal spines: only femur dorsal distal 2.

Palp. Both tibia and patella short, with former only little longer than latter; a moderately developed white fringe along dorsal surface of femora, patellae, and tibiae. Bulb considerably swollen; embolus arises from base of bulb, curves prolaterally around margin to terminate anteriorly after completing about two thirds of a circle. Tibial retrolateral apophysis a long stout spur with a deep excavation at its base (Figs. 20–21).

Abdomen. Elongate ovoid, not flattened, longer than wide in ratio of about 2 : 1, widest about the middle, with a small and weakly developed dorsal shield, anal tubercle a short broad cone covered by a tuft of white hairs; spinnerets of moderate length, all rather slender, anterior pair the stoutest. Position of colulus indicated by a small tuft of stiff black hairs. Tracheal spiracle near base of spinnerets, without a tubercle.

Color in alcohol. Carapace: interocular area and region from PLE to steep posterior declivity is a rich dark reddish brown, eyes on black spots; lateral sides and posterior declivity a much lighter reddish brown; ventral margin is black with a narrow white band made of flattened hairs. Palps and other mouth parts different shades of amber. Legs: first pair with brown tibiae, elsewhere amber; other legs somewhat lighter amber, posterior pair with a retrolateral black stripe from patella to metatarsus inclusive. Abdomen: posterior quarter nearly black; at anterior margin of black part is a narrow transverse yellowish-white bar; extending from near base to near the light bar is a pair of narrow yellowish-white stripes enclosing a central dark stripe; lateral to these the abdomen is dark gray including the venter; just at base of anal tubercle is a small white spot; at posterior end of dorsal light stripes is a faint incomplete narrow yellowish-white bar (in some paratypes this bar is more conspicuous).

Female allotype. Total length 10.24 mm. Carapace 3.84 mm. long, 2.56 mm. wide just behind PLE which occupy nearly eleven thirteenths of width of carapace at their level, 1.28 mm. tall and, therefore, almost exactly half as tall as wide. Otherwise essentially as in male.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal border of AME cuts off about one seventh of the diameter of ALE. Anterior row and posterior row of equal width. Quadrangle of laterals wider than long in ratio of 8 : 5. Total eye space occupies two fifths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 31 : 15 : 5 : 14. AME separated from one an-

other by one tenth of their diameter, from ALE by one twentieth of their diameter. Middle eyes closer to ALE than to PLE in ratio of 16 : 19. Height of clypeus equal to one tenth the diameter of AME. Otherwise essentially as in male.

Chelicerae. Basal segment .96 mm. long, gibbous in front obliquely across middle, promargin with four small teeth closely crowded together, retromargin with a single small tooth. Otherwise essentially as in male.

Maxillae, Lip, and *Sternum.* Essentially as in male.

Legs. 4132. Tibial index of first leg 22, of fourth leg 11.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.92	1.40	1.30	.96	.70	6.28
2.	1.66	1.20	1.15	.83	.64	5.48
3.	1.66	1.02	1.15	1.15	.70	5.68
4.	2.24	1.15	1.86	1.73	.70	7.68

First femora, patellae, and tibiae much swollen; the same segments of second leg somewhat swollen.

Spines. First leg: femur only dorsal 0–0–1–1–1–0; patella 0; tibia only ventral 0–0–2 (small cusps); metatarsus only ventral 0–2–2 (cusps). Second leg: femur as in first except prolateral distal 1; patella and tibia 0; metatarsus only 0–1r–2 (all cusps). Third leg: femur as in second; patella 0; tibia only prolateral 0–0–1 and ventral 0–0–1p; metatarsus prolateral 0–2, retrolateral 0–1, ventral 0–1. Fourth leg: femur and patella as in first; tibia only ventral 0–0–1p; metatarsus as in third.

Abdomen. Essentially as in male.

Epigynum. A simple, mildly convex plate; at some distance in front of posterior border is main part, limited by gracefully curved lines (Fig. 22). Resembles rather closely the epigynum of B. milvina (C. Koch).

Color in alcohol. Almost exactly like that of male.

Type locality. Male holotype from Canal Zone Biological Area, Aug., 1939; female allotype from same locality, June, 1939. Numerous paratypes of both sexes from Canal Zone Biological Area: June–July, 1934; June–August, 1936; June–August, 1939; also Porto Bello and Arraijan, R. P., Aug., 1936; El Valle, R. P., July, 1936; Ft. Randolph and Ft. Davis, C. Z., Aug., 1936; Canal Zone Forest Reserve, Madden Dam, Ft. Sherman, France Field, C. Z., Aug. 1939.

Breda punctata (Peckham), 1894

Balmaceda punctata Peckham, 1894
B. punctata F. Cambridge, 1901
B. punctata Simon, 1903
B. punctata Petrunkevitch, 1911
B. punctata Petrunkevitch, 1925
Fuentes punctatus Banks, 1929

I place this species in the genus Breda on the basis of the structure of the male palps and the epigynum, the reduction of leg spines, the single simple tooth on the retromargin of the fang groove, the features of the carapace, and the placement of the eyes. Mr. Banks ('29) had one female from Las Sabanas, R. P., July, 1924, but the species has not appeared in my collection.

Genus Marpissa C. Koch, 1846

Marpissa magna (Peckham), 1894

Figures 23–26

Marptusa magna Peckham, 1894
Marpissa magna F. Cambridge, 1901
M. magna Petrunkevitch, 1911
M. magna Banks, 1929
Menemerus delus Chamberlin and Ivie, 1936

The Peckhams had mature females and an immature male. F. Cambridge gave a very good figure of the male palp but almost no description. Banks ('29) took a female and an immature male in the Canal Zone Biological Area, June, 1924. Since no detailed descriptions have ever been published I have considered it desirable to establish hypotypes of both sexes and give here careful descriptions of the same.

Male hypotype. Total length 10.88 mm. Carapace 4.35 mm. long, 3.39 mm. wide a short distance behind PLE which occupy two thirds of width of carapace at their level, 1.53 mm. tall at level of PLE and, therefore, less than one half as tall as wide; depressed in middle of cephalic region and also lateral to PLE, PME and ALE so that these eyes stand up on a tuberculated ridge; region just posterior to PLE also depressed medially; seen in profile, rises gently to PLE, then descends again very gently to steep posterior declivity (Fig. 23); very hairy, with many long black bristles around eyes of which four groups seem to be most characteristic; a group of these consisting of five lies at some distance below PME, the other group of three lies behind and

below PME. A short median longitudinal thoracic groove lies nearly halfway from opposite posterior border of PLE to beginning of steep posterior declivity.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME passes through center of ALE. Anterior row wider than posterior row in ratio of 9 : 8. Quadrangle of laterals wider than long in ratio of 36 : 23. Total eye space occupies twenty-seven sixty-fifths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 14 : 8 : 2 : 7. AME separated from one another by one tenth of their diameter, from ALE by one third of their diameter. Middle eyes only a little closer to ALE than to PLE. Height of clypeus equal to about one seventh of the diameter of AME. Clypeus decorated with long white simple hairs which converge from each side toward middle where they overlap, a transverse row of long stiff bristles, three bristles in lower angle between AME. Also a row of stiff black bristles above AME. A prominent tuft of white hair below PME and PLE give a characteristic appearance.

Chelicerae. Vertical, parallel, fairly robust, slightly swollen in middle along outer margin, basal segment 1.53 mm. long, with numerous slender black bristles on prolateral (front) surface; promargin of fang groove with two teeth of moderate size; retromargin of fang groove with a single tooth of moderate size. Fang evenly curved.

Maxillae. Parallel, longer than wide in middle in ratio of nearly 3 : 1, deeply notched in middle of outer margin, outer distal corner with a conspicuous hook.

Lip. Longer than wide in ratio of 4 : 3, basal excavations reach about two fifths of length of organ, reaches nearly two thirds the length of maxillae. Sternal suture narrow and slightly procurved.

Sternum. Strongly convex across middle, longer than wide in ratio of 29 : 19, widest between third coxae, covered by many stiff black bristles, posterior end very blunt and not extended between fourth coxae which are separated by three elevenths of their diameter.

Legs. 1423. Tibial index of first leg 13, of fourth leg 12.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.90	2.04	2.88	2.36	.96	11.14
2.	2.43	1.53	1.98	1.60	.83	8.37
3.	2.43	1.28	1.73	1.66	.76	7.86
4.	2.82	1.52	2.24	1.76	.96	9.30
Palp	1.47	.40	.45	—	1.28	3.60

First pair with a moderately developed ventral fringe, especially on patellae and tibiae, mostly of black hairs but many white ones at distal end of tibiae. Remnants of a ventral fringe on patellae, tibiae, and metatarsi of second pair.

Spines. First leg: femur only dorsal 0–1–1–1–0, three prolateral opposite second dorsal; patella 0; tibia prolateral 0–1–1–0, ventral 2–2–2, retrolateral 0–0–1–0; metatarsus only ventral 2–2. Second leg: femur only dorsal 1–1–1, prolateral 0–1–2; patella 0; tibia and metatarsus as in first except tibia prolateral 0–0–1. Third leg: femur and patella as in second except femur retrolateral 0–1–2 (close together); tibia prolateral 0–1, ventral 2–0–2, retrolateral 0–1; metatarsus prolateral 0–2, ventral 2–2, retrolateral 0–2. Fourth leg: femur dorsal 1–1–1, prolateral 0–1–2, retrolateral 0–0–1; patella 0; tibia as in third except ventral 1r–2; metatarsus prolateral 0–1, ventral 0–2, retrolateral 0–1. Palpal spines: only femur dorsal 0–1–1.

Palp. Patella and tibia short, with latter somewhat the longer; femur with a conspicuous ventral proximal tubercle, somewhat excavated ventrally; two retrolateral tibial apophyses, the ventral one small and blunt, the dorsal one much longer, pointed and somewhat twisted. Tarsus with a swollen, twisted bulb having a conspicuous median tubercle; embolus arises near base on prolateral side and curves forward around distal end of bulb as a very slender spine (Figs. 24–25). Very hairy, with a white dorsal fringe which becomes black laterally on both sides; also coppery scales especially on tarsus.

Abdomen. Elongate ovoid, not flattened, longer than wide in ratio of 40 : 19; widest about two fifths from base, with a moderately well chitinized dorsal shield covering about two thirds of surface, with numerous long black, nearly erect bristles, two deeply imprinted dorsal sigilla about midway, tracheal spiracle near base of quite normal spinnerets.

Color in alcohol. Carapace: ground color a rich reddish brown; eyes on black spots; much white hair on dorsal part and most conscipuous around eyes especially in interocular area and laterally below ALE, PME and PLE where lateral tufts occur, also a patch of white hair in center of steep posterior declivity; posterior halves of lateral sides covered with black hair; many coppery scales around eyes. All legs with much white hair and many coppery scales; palps the same; first pair of legs with conspicuous proximal ventral black spots on tibiae as well as black distal annuli on these segments and some others. Abdomen: dorsal shield amber, surrounded by yellowish-white; dorso-

laterally abdomen is brownish with many coppery scales; venter dark gray with four long rows of yellowish dots.

Female hypotype. Total length 10.04 mm. Carapace 4.24 mm. long, 3.52 mm. wide a short distance behind PLE which occupy about three fifths of width of carapace at their level. Other features essentially as in male except that steep posterior declivity is more abrupt than in that sex.

Eyes. Viewed from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one third of diameter of ALE. Total eye space occupies thirteen thirty-fourths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 25 : 15 : 5 : 13.5. AME separated from one another by one seventh of their diameter, from ALE by one third of their diameter. Other features essentially as in male.

Chelicerae. Essentially as in male except they are more swollen in front and basal segment is 1.02 mm. long.

Maxillae, Lip, and *Sternum.* Essentially as in male except maxillae not so deeply notched laterally and outer distal angle well rounded, without hook.

Legs. 4123. Tibial index of first leg 18, of fourth leg 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.36	1.79	1.81	1.54	.90	8.40
2.	2.24	1.41	1.66	1.28	.83	7.42
3.	2.30	1.20	1.53	1.47	.83	7.33
4.	2.94	1.53	2.18	1.71	1.02	9.38

Legs with much long whitish hair but with no definite fringes. Palps also with much long whitish hair.

Spines. First leg: as in male except tibial prolateral 0–1–0. Second leg: as in male. Third leg: femur and patella as in male except retrolateral 0–0–1; tibia only prolateral and retrolateral 0–0–1, ventral 0–0–2; metatarsus only distal whorl of six (2–2–2). Fourth leg: femur and patella as in male except retrolateral 0–0–1; tibia only ventral 0–0–2; metatarsus only prolateral 0–1, ventral 0–2.

Abdomen. Essentially as in male except dorsal shield lacking.

Epigynum. Epigynal plate somewhat broader than long; posterior notch bordered by two tubercles; a conspicuous set of spermathecae and tubes within, a short distance in front of posterior notch; near anterior border is a large median shallow depression (Fig. 26).

Color in alcohol. Essentially as in male except on abdomen where

a broad central yellowish stripe, widest in middle, occupies the region covered by the dorsal shield and its yellowish border in the male; the central stripe has many coppery scales

Type locality. Male hypotype from Canal Zone Biological Area, Aug., 1939; female hypotype from same locality, July, 1934. One additional mature male and several females from Canal Zone Forest Reserve, C. Z., July–August, 1939.

Genus Menemerus Simon, 1868

Menemerus bivittatus (Dufour), 1831

Salticus bivittatus Dufour, 1831
Marpissa melanognatha F. Cambridge, 1901
M. melanognatha Peckham, 1901
Menemerus bivittatus Petrunkevitch, 1911
M. bivittatus Petrunkevitch, 1925
M. bivittatus Banks, 1929

A cosmopolitan species known under many names of which I have cited only a few. Only one specimen, a female, from Ft. Randolph, C. Z., Aug., 1936.

Parkella gen. nov.

Carapace fairly low, broad, widest near middle, sides gently rounded, quite flat dorsally to steep posterior declivity, with short median thoracic groove about halfway from PLE to steep posterior declivity. *Eyes:* anterior row moderately recurved; PME about midway between ALE and PLE; PLE occupy nearly full width of carapace; posterior row slightly wider than anterior row; quadrangle of laterals distinctly wider than long; total eye space occupies nearly one half the length of carapace. *Clypeus* low. *Chelicerae* of moderate size, parallel, vertical; retromargin of fang groove with a small single simple tooth. *Maxillae* unmodified. *Sternum* much narrowed in front between first coxae; widest between second coxae. *Legs:* 4123; first pair considerably enlarged in both sexes; all others moderately robust; leg spines definitely reduced in number and size in general. *Abdomen* elongate ovoid; spinnerets of moderate size. Male palps and epigyna appear to ally the genus to such members of the group as Marpissa and Breda. *Genotype: Parkella venusta* sp. nov.

PARKELLA VENUSTA spec. nov.

Figures 27–30

Male holotype. Total length 4.16 mm. Carapace 1.98 mm. long, 1.41 mm. wide slightly behind PLE which occupy about eleven twelfths of the width of the carapace at their level, .84 mm. tall at level of PLE and, therefore, about four sevenths as tall as wide, nearly flat across dorsal surface; seen in profile, rises slightly to PLE, then descends slightly to steep posterior declivity which begins nearly three fourths of the distance from PLE to posterior margin (Figs. 27–28); with few short hairs; ocular area finely rugulose; postocular area finely beaded; both of latter areas waxy and somewhat iridescent; a short median longitudinal groove about half way to posterior declivity.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME just misses dorsal borders of ALE. Posterior row wider than anterior row in ratio of about 12 : 11. Quadrangle of laterals wider behind than long in ratio of about 8 : 5. Total eye space occupies twenty-eight sixty-firsts of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 16 : 9 : 3 : 9. AME separated from one another by about one sixteenth of their diameter, from ALE by about the same distance. Middle eyes midway between ALE and PLE or slightly closer to ALE. Height of clypeus equal to about five sixteenths of diameter of AME. Clypeus decorated only with long brownish bristles converging toward middle line, and three long upturned black bristles in lower angle between AME.

Chelicerae. Vertical, parallel, of moderate size, somewhat flattened and rugulose on front surface which is sparsely covered with long brownish stiff hairs; basal segment about .38 mm. long; promargin of fang groove with two very small teeth, retromargin with a single, rather small simple tooth. Fang of moderate size and evenly curved.

Maxillae. Parallel, longer than wide in middle in ratio of about 2 : 1, moderately notched in middle of outer margin; outer distal corner sharply pointed but without definite tubercle or hook.

Lip. Somewhat hidden by first coxae. Longer than wide in ratio of about 15 : 12, reaches just beyond middle of maxillae. Sternal suture straight.

Sternum. Quite strongly convex, especially in posterior half, longer than wide in ratio of 8 : 5, widest between second coxae. Enlarged first coxæ extend over sternum and are separated by less than two fifths of greatest width of latter. Posterior end blunt and not extended between

fourth coxae which are separated by about one eighth their diameter.

Legs. 4123. Tibial index of first leg 23, of fourth leg 18.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
		(All measurements in millimeters)				
1.	1.15	.64	.80	.48	.35	3.42
2.	.83	.52	.54	.45	.38	2.72
3.	.83	.43	.50	.51	.38	2.65
4.	1.09	.56	.70	.64	.45	3.44
Palp	.53	.17	.17	—	.64	1.51

First pair considerably swollen (Fig. 29) and with a moderately well developed ventral black fringe on patellae and tibiae.

Spines. First leg: femur only dorsal 0–0–1–1–1–0 and prolateral near distal end 1–2; patella 0; tibia only ventral 0–2–2–2 (near distal end), all tibial spines reduced in size, promarginal more than retromarginal; metatarsus only ventral 0–2–2. Second leg: femur and patella as in first except femur prolateral only one near distal end; tibia only ventral 0–1 (near middle)—1r; metatarsus only prolateral 0–1, ventral 0–1r (long, robust)–1r. Third leg: femur and patella as in first except femur prolateral 0–1 (very small)–1; tibia only prolateral 0–1–0, ventral 0–0–1p; metatarsus only prolateral 0–0–1, ventral 0–0–1p. Fourth leg: femur only dorsal 0–1–1–1, prolateral only 2 near distal end; patella 0; tibia only ventral 1p–0–1p; metatarsus only ventral 0–1p–2.

Palp. Patella and tibia very short. Tibia drawn out retrolaterally into a long distally attenuated apophysis; also a short blunt ventral tibial apophysis close to base of bulb which has a small basal lobule. Embolus arises near middle of prolateral side, curves gently to terminate near distal end of bulb (Fig. 30). With a moderate amount of hair but with no fringes.

Abdomen. Elongate ovoid, not appreciably flattened dorsoventrally, longer than wide in ratio of about 2 : 1, widest near middle but nearly as wide at base; with a moderately well chitinized small dorsal shield covering anterior two thirds; with numerous fairly long black bristles more or less erect. Anal tubercle a small cone largely hidden by retraction and a tuft of whitish hair.

Color in alcohol. Carapace: generally a rich dark brown, black around eyes; with a narrow white marginal stripe from posterior lateral corner to opposite interval between first and second coxae. Sternum a rich brown with mouth parts the same with lighter tips. Legs: first pair a rich dark brown with metatarsi light brown and tarsi

a light amber; other legs similar but progressively somewhat lighter to fourth. Palps: a rich dark brown. Abdomen: generally a brownish gray with dorsal shield brown; lateral sides finely striped with gray and yellowish; venter dark brown with epigastric plate quite strongly chitinized and finely dotted with brown, much lighter in center.

Type locality. Male holotype from Ft. Sherman, C. Z., Aug., 1939. No paratypes.

Parkella fusca spec. nov.

Figures 31–32

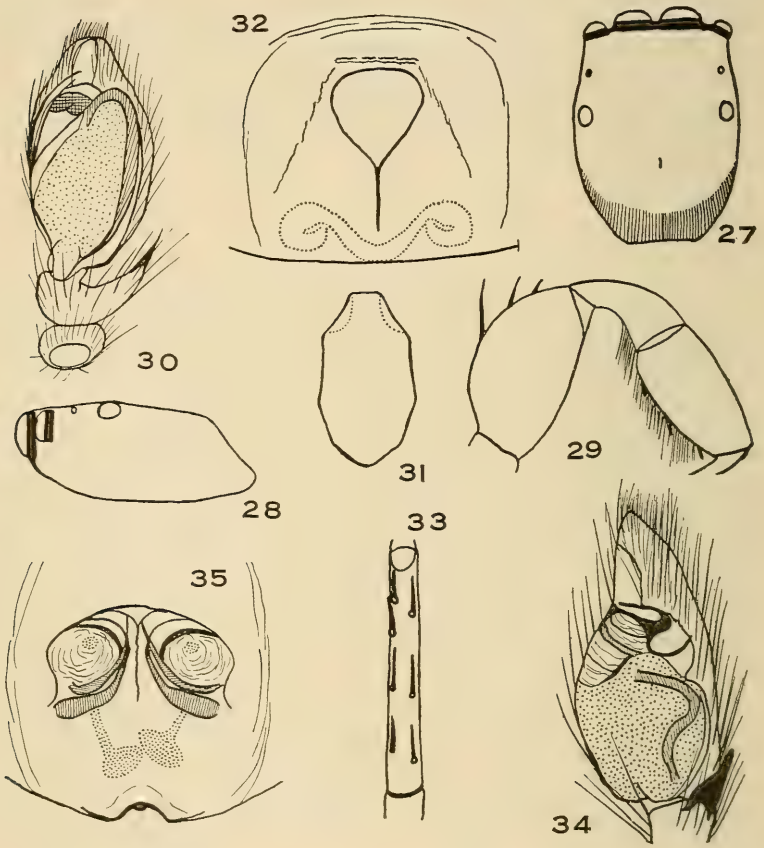
There is a possibility that the female described here belongs with *P. venusta* spec. nov., but it seems unwise to combine them until a greater certainty exists concerning their relationship.

Female holotype. Total length 5.38 mm. Carapace 2.24 mm. long, 1.47 mm. wide just behind PLE which occupy about thirteen fourteenths of width of carapace at their level, .83 mm. tall and, therefore, about four sevenths as tall as wide; almost flat dorsally throughout ocular and postocular areas to steep posterior declivity which begins about two thirds of the distance from PLE to posterior border (with just a slight depression beneath and behind PLE); with no long hair, but with numerous black erect bristles and a sparse supply of short black hair; a short median longitudinal groove a little less than one half the distance from opposite PLE to steep posterior declivity.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME just misses dorsal borders of ALE. Posterior row wider than anterior row in ratio of 23 : 21. Quadrangle of laterals wider behind than long in ratio of 23 : 14. Total eye space occupies seventeen thirty-fifths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 20 : 11 : 3.5 : 10. AME separated from one another only slightly, from ALE by one twentieth of their diameter. Middle eyes slightly closer to ALE than to PLE. Height of clypeus equal to three twentieths of the diameter of AME. Clypeus decorated only with numerous long brown bristles converging toward middle line, and three long upturned bristles in lower angle between AME.

Chelicerae. Essentially parallel, vertical, of moderate size, somewhat gibbous in front, basal segment .56 mm. long. Fang of moderate size and evenly curved. Fang groove with two small promarginal teeth and a single simple small retromarginal tooth.

Maxillae. Parallel, without special modifications, longer than wide



External Anatomy of Spiders

Figs. 27–28. *Parkella venusta* Chickering; male carapace, dorsal and lateral views.
Fig. 29. *P. venusta* Chickering; first leg, male, lateral view.
Fig. 30. *P. venusta* Chickering; male palp, ventral view.
Figs. 31–32. *Parkella fusca* Chickering; female sternum and epigynum.
Figs. 33–34. *Itata completa*, first tibia, ventral view; male palp, ventro-retro-lateral view.
Fig. 35. *I. completa* , epigynum, ventral view.

in middle in ratio of about 5 : 3; only moderately notched in middle of outer margin; outer distal corner well rounded, without tubercle or hook.

Lip. Longer than wide in ratio of about 4 : 3, without special modifications; reaches about three fifths the length of maxillae. Sternal suture straight.

Sternum. Longer than wide in ratio of 45 : 26, widest at interval between second and third coxae (Fig. 31); much narrowed at anterior end where enlarged first coxae overlap it considerably; posterior end blunt and not extended between fourth coxae which are separated by about one third of their diameter.

Legs. 4123. Tibial index of first leg 23, of fourth leg 15.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.97	.64	.68	.43	.38	3.10
2.	.77	.51	.45	.45	.38	2.56
3.	.64	.45	.51	.51	.38	2.49
4.	1.15	.64	.82	.68	.45	3.74

First pair of legs considerably enlarged; no fringes on any legs, and only a moderate amount of black hair generally distributed.

Spines. First leg: femur only dorsal 0–1–1–1–0 and prolateral two small ones near distal end; patella 0; tibia only ventral 0–2–2–2 (last pair near distal end), tibial spines reduced in size with those along retromargin hardly more than cusps; metatarsus only ventral 0–2–2 (also small along retromargin).

Second leg: femur and patella as in first except femur prolateral only one near distal end; tibia only ventral 0–1 (near middle) –0; metatarsus only prolateral 0–0–1 and ventral 0–1 (near middle) –1r, all spines lacking on tibia and metatarsus on left side. Third leg: femur and patella as in second except femur retrolateral one distal; tibia 0; metatarsus only prolateral 0–1 and ventral 0–1 (near middle). Fourth leg: femur and patella as in third; tibia only ventral 0–0–1 (near middle); metatarsus only ventral 1–2. Palps without significant spines, but with many long bristles; tarsi very hairy on prolateral side.

Abdomen. Ovoid, widest about two fifths from base, longer than wide in ratio of 11 : 6. Anal tubercle a somewhat flattened cone with a tuft of white hairs. All six spinnerets of moderate size, unnoteworthy in general appearance. Position of colulus indicated by three or four

black bristles. Tracheal spiracle at base of spinnerets and without tubercle.

Epigynum. Epigynal plate of moderate size, fairly simple; of the type commonly found in females of this group; anterior half with a white area, broad anteriorly and constricted behind; without a posterior marginal notch (Fig. 32).

Color in alcohol. Carapace generally reddish brown with eyes on black spots; dorsal postocular area much lighter brown. Sternum, legs, and mouth parts all brownish with first pair of legs darkest except posterior femora which are dark brown laterally. Abdomen: brownish gray dorsally with faint yellowish chevrons in posterior half; lateral sides with very narrow yellowish stripes between broader brownish stripes; venter brownish with four rows of yellowish dots converging toward base of spinnerets.

Type locality. Female holotype from Canal Zone Biological Area, July, 1934. No paratypes.

Itata Group

Only two genera in this group have been reported from Panama, each with only one species.

Key to the genera in the Itata Group

1. Very small spiders, about 3 mm. long; carapace long, low and narrow; anterior row of eyes somewhat shorter than posterior row; PME slightly nearer to ALE than to PLE; sternum long and narrow; spines almost completely lacking ..... *Mica*, (p. 57)
1. Medium to large spiders; carapace moderately low, quite broad; anterior row of eyes slightly wider than posterior row; PME considerably nearer to ALE than to PLE; sternum fairly broad; spines plentiful. *Itata*, (p. 54)

Genus Itata Peckham, 1894

Itata completa (Banks), 1929

Figures 33–35

Lyssomanes completus Banks, 1929

Mr. Banks ('29) had three males from the Canal Zone Biological Area. I have several of both sexes from the same locality. A comparison of this species with the type of *Itata vadia* Peckham, which is also the genotype, shows that it belongs to this genus. I make the transfer without hesitation. I have selected a female for a detailed description of the allotype together with a few notes regarding the male. The type

males show four ventral tibial spines along the promargin and three along the retromargin (Fig. 33); the second pair of tibiae show the following ventral spines: 1r–2–2, third and fourth tibiae have no spines; first femur with one dorsal distal and one prolateral distal spine; all other femora with only one dorsal distal spine. The male palp has an embolus which arises at distal end of bulb and curves closely into nearly a complete circle; just posterior to this is an apophysis (clearly seen only when bulb is inflated) which extends retrolaterally and ends in a slender pointed filament (Fig. 34).

Female allotype. Total length 10.30 mm. Carapace 3.58 mm. long, 2.62 mm. wide at level of PLE which occupy about seven tenths of width of carapace at their level, just slightly less than half as tall as wide, descent from PLE gradual with no steep posterior declivity, a short median longitudinal thoracic groove begins considerably behind posterior border of PLE.

Eyes. Viewed from in front, anterior row so strongly recurved that a line tangent to dorsal borders of AME passes through center of ALE. Anterior row wider than posterior row in ratio of 31 : 28, wider than middle row in ratio of 31 : 25. Quadrangle of laterals wider than long in ratio of 31 : 22. Total eye space occupies twenty fifty-fifths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 31 : 15 : 3.5 : 14. AME barely separated from one another, from ALE by about one tenth of their diameter. Middle eyes closer to ALE than to PLE in ratio of about 2 : 3. Height of clypeus equal to one sixth of the diameter of AME. Clypeus decorated with a ventral fringe of light colored simple hairs, a transverse row of seven or eight long bristles across the middle, and the usual three long bristles in the lower angle between AME.

Chelicerae. Essentially parallel, somewhat porrect, robust but short for such a large body, basal segment 1.21 mm. long, lateral margin rounded (somewhat swollen in middle), clypeal fringe makes a whitish band across proximal margin. Fang fairly robust, evenly curved. Fang groove with two rather small teeth on promargin near inner (medial) end of groove; a single retromarginal tooth about midway from medial end of groove to base of fang.

Maxillae. Parallel, longer than wide in middle in ratio of about 3 : 1, deeply notched laterally, palp inserted into basal third, outer distal angle well rounded.

Lip. Longer than wide in ratio of about 3 : 2; basal excavations reach nearly to middle of organ; reaches slightly beyond middle of maxillae. Sternal suture slightly procurved.

Sternum. Longer than wide in ratio of 35 : 23, nearly equally wide between second and third coxae, quite strongly convex in middle between second coxae, posterior end blunt and not extended between fourth coxae which are nearly contiguous.

Legs. 4123. Tibial index of first leg 12, of fourth leg 8.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	3.01	1.66	2.62	1.98	.89	10.16
2.	2.56	1.21	1.98	1.53	.70	7.98
3.	2.24	1.15	1.66	1.88	.83	7.76
4.	3.20	1.21	2.62	2.56	.83	10.42

First pair of legs considerably the stoutest, others slender and weak for so large a spider. A very weakly developed white ventral fringe on first pair from femora to metatarsi.

Spines. First leg: femur dorsal and prolateral distal 1; patella 0; tibia only ventral four on promargin and three on retromargin as in male (these are very robust); metatarsus only ventral 2–2. Second leg: femur only dorsal distal 1; patella 0; tibia only ventral 1r–2–2 (not definitely paired); metatarsus only ventral 2–2 (last two offset laterally). Third and fourth legs only femur dorsal distal 1. Apparently a very slender transparent palpal claw without teeth.

Abdomen. Very slender, elongate, truncated at base, longer than wide in ratio of about 4 : 1, nearly as wide at base as at widest part which is about two fifths from base. Anal tubercle a short broad cone. Six spinnerets rather short. Position of colulus not indicated. Tracheal spiracle near base of spinnerets.

Epigynum. Epigynal plate rather large. Posterior margin conspicuously notched. Some distance anterior to notch is a pair of small spermathecae contiguous and with small tubules leading to openings in two large depressions separated by a fairly broad septum (Fig. 35).

Color in alcohol. Carapace generally yellowish; eyes on dark brownish spots; beginning at ALE and extending to posterior border are two narrow bright orange red stripes; between ALE is a brush of orange red hairs which also extend below ALE and PME in a lateral tuft; between and medial to PME and PLE are two large subchitinous chalky patches of guanin; extending laterally on each side from clypeus as far as opposite middle of first coxae is another orange red stripe. Chelicerae, maxillae and lip a rich reddish brown, maxillae with a dark distal patch on retrolateral surface. First pair of legs a bright reddish brown on lateral surfaces, elsewhere amber color. All

other legs and palps a unicolorous light amber. Abdomen: generally yellowish with several faint dark dorsal spots and a series of seven pairs of small white dorsal spots made by deposits of guanin; the third of these pairs is united into a single spot; venter yellowish.

Type locality. Female allotype from Canal Zone Biological Area, August, 1939. Female paratypes from same locality together with numerous males: June–July, 1934, 1936, 1939.

Genus Mica Petrunkevitch, 1925

Mica longithorax Petrunkevitch, 1925

Professor Petrunkevitch described this species from a female taken at Frijoles, C. Z. Although I have repeatedly collected in the same locality where this interesting little spider was taken the species has not yet appeared in my collection.

Rudra Group

Key to the genera in the Rudra Group

1. Carapace moderately depressed, more or less hairy; PLE occupy from two thirds to nearly four fifths the width of carapace; quadrangle of laterals somewhat wider in front than behind; total eye space occupies from two fifths to one half the length of carapace; PME slightly closer to ALE than to PLE; anterior tibiae with three pairs of ventral spines; abdomen usually somewhat depressed ..... *Balmaceda*, (p. 57)
1. Not with combination of characters given above 2
2. Carapace quite low and flat, moderately hairy; PLE occupy about five sixths of width of carapace; quadrangle of laterals nearly twice as wide as long; total eye space occupies about two fifths the length of carapace; PME considerably closer to ALE than to PLE; anterior tibiae with four ventral spines on promargin ..... *Mabellina*, (p. 68)
2. Carapace very low and flat, with very little hair; PLE occupy nearly twelve thirteenths of width of carapace; quadrangle of laterals nearly twice as wide as long; total eye space occupies about two fifths of length of carapace; PME slightly closer to ALE than to PLE; anterior tibiae with three pairs of long ventral spines crowded into distal two thirds of segment ..... *Rudra*, (p. 72)

Genus Balmaceda Peckham, 1894

Two species are now represented by males, three by females. These may be separated by the following key:

Key to the species of Balmaceda

Males

1. Embolus arises in front of middle of bulb, its base occupying nearly half the width of bulb and extends distally nearly straight; palpal tibial retrolateral apophysis very broad at base, reaches beyond middle of bulb; palpal femur straight ..... *B. peckhami*, (p. 58)
1. Embolus arises behind middle of bulb nearer its base, occupies much less than half the width of bulb, and distinctly curves as it extends distally; palpal tibial retrolateral apophysis much narrower at base, does not reach to middle of bulb; palpal femur somewhat curved. *B. picta*, (p. 61)

BALMACEDA PECKHAMI spec. nov.

Figures 36–41

This species is undoubtedly a close relative of *B. picta* Peckham, but on the basis of several differences it must be considered distinct. The clearest distinctions are found from a comparison of the palps of the two species.

Male holotype. Total length 4.84 mm. Carapace 2.49 mm. long, 1.70 mm. wide some distance behind PLE which occupy ten thirteenths of width of carapace at their level, .96 mm. tall and, therefore, about .56 as tall as wide, interocular region flat, very slightly raised from AME to PLE, then a slight drop just behind PLE, then nearly flat again to steep posterior declivity which begins about halfway from PLE to posterior border, widest just behind PLE (Figs. 36–37); with a median longitudinal thoracic groove of moderate length beginning about one seventh of distance from PLE to posterior border.

Eyes. Anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one sixth of the diameter of ALE. Anterior row wider than posterior row in ratio of about 13 : 12, wider than middle row in ratio of about 13 : 11. Quadrangle of laterals wider than long in ratio of about 13 : 9. Total eye space occupies almost exactly half the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 22 : 12 : 2 : 11. AME nearly contiguous to one another and to PLE. Height of clypeus equal to one eleventh of the diameter of AME. Clypeus decorated with a ventral fringe of reddish brown bristles and three brownish bristles in lower angle between AME.

Chelicerae. Slightly porrect, essentially parallel, very moderately produced, basal segment .82 mm. long, transversely rugulose and somewhat flattened in front, outer border strongly chitinized and sharply ridged from basal boss to distal end. Fang robust at base,

constricted about two fifths from base, remainder evenly curved. Fang groove distinct, with two promarginal teeth, and a single robust fissidentate tooth on retromargin (Fig. 38).

Maxillae. Parallel, longer than wide in middle in ratio of about 3 : 1; of unusual form; angle between truncature and distal border acute and with a tubercle; outer distal angle with another tubercle (Fig. 39); fairly deeply notched in middle of outer border.

Lip. Longer than wide in ratio of 21 : 16, basal excavations reach about two fifths the length of the organ, reaches to middle of maxillae. Sternal suture straight.

Sternum. Longer than wide in ratio of 43 : 30, much narrower at anterior border than base of lip, widest between third coxae but nearly as wide between second coxae, moderately convex, broadly rounded at posterior end which is not extended between fourth coxae which are separated by about one fifth their diameter (Fig. 40). Small areas at anterolateral corners appear to be somewhat bevelled for contact with anterior coxae.

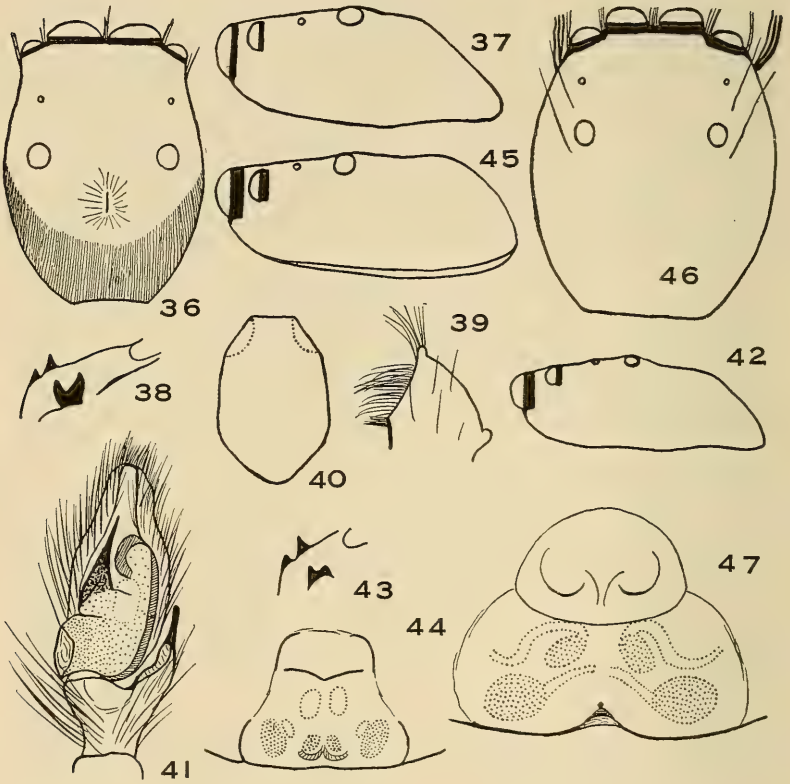
Legs. 1432. Tibial index of first leg 14, of fourth leg 11.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.35	1.00	1.26	.84	.48	4.93
2.	1.15	.70	.83	.75	.45	3.88
3.	1.13	.64	.83	.89	.53	4.02
4.	1.28	.73	1.02	.95	.51	4.49
Palp	.88	.40	.32	—	.83	2.43

All legs with a moderate amount of hair but with no ventral fringes. First pair with several patches of white lanceolate hair. First coxae much the stoutest.

Spines. First leg: femur dorsal 0–1–1–1 (very small), prolateral only one near distal end; patella 0; tibia only ventral 2–2–2 (not terminal), with promarginal series occupying distal eight elevenths of segment; metatarsus only ventral 2–2 on right and 1r–1r on left. Second leg: femur and patella as in first; tibia only ventral 1r–2–2, with promarginal series weak and retromarginal series long except the most distal which is also weak; metatarsus only ventral 2–2. Third leg: femur and patella as in first; tibia 0; metatarsus only ventral 0–1, retrolateral 0–1. Fourth leg: femur dorsal 0–1–1–1, retrolateral only distal 1; elsewhere 0. Palpal spines 0.

Palp. Femur straight; patella and tibia relatively short with latter about four fifths as long as former; tibial retrolateral apophysis a long



External Anatomy of Spiders

Figs. 36–37. *Balmaceda peckhami* Chickering; carapace, dorsal and lateral views.
Fig. 38. *B. peckhami* Chickering; male cheliceral teeth.
Fig. 39. *B. peckhami* Chickering; tip of maxilla.
Fig. 40. *B. peckhami* Chickering; sternum.
Fig. 41. *B. peckhami* Chickering; male palp, ventral view.
Fig. 42. *B. picta*, carapace, lateral view.
Fig. 43. *B. picta*, female cheliceral teeth.
Fig. 44. *B. picta*, epigynum.
Figs. 45–46. *B. reducta* Chickering; carapace, lateral and dorsal views.
Fig. 47. *B. reducta* Chickering; epigynum.

spur, robust at base, slender in distal three fifths; a dorsal crest of white lanceolate hairs and long white simple hairs on femur, patella, tibia and less markedly on tarsus; also a prolateral fringe of long white and black hairs on tibia and to some extent on distal half of femur; bulb much swollen in proximal half; embolus a long, nearly straight spine, robust at base, arising from near middle of bulb (Fig. 41).

Abdomen. Elongate ovoid, longer than wide in ratio of 40 : 19, widest just before the middle; anal tubercle a broad flattened cone; spinnerets of moderate length closely crowded, the posterior pair slightly longer than anterior pair which is the most robust; position of colulus indicated by a tuft of black hair; tracheal spiracle near base of spinnerets, with indistinct lip and no tubercle.

Color in alcohol. Carapace: generally a rich reddish brown; black spots around eyes more extensive than usual and unite to extend the very dark area over all but central part of interocular region; scattered white lanceolate hairs tend to give a grayish color to whole region and black hair along lateral sides darken these areas. Chelicerae, maxillae, and lip all are reddish brown with usual whitish tips of two latter organs nearly absent. Legs: all coxae amber with first the darkest and fourth the lightest; first tarsi yellowish-white, other segments reddish brown, lighter above, many white lanceolate hairs on dorsal and prolateral surfaces of femora, patellae, tibiae and metatarsi; second, third, and fourth legs yellowish-white with brownish spots, the most conspicuous of which are prolateral with a retrolateral spot near distal end of these femora and at both ends of tibiae and metatarsi. Abdomen: dark brown at base; a brownish central dorsal stripe extends about to the middle and is there replaced by a light stripe much indented marginally and embracing several faint brownish chevrons; lateral and dorsolateral regions with many small brownish spots, short stripes over a yellowish background; near middle is a pair of spots, the largest and best defined of all; venter with a broad gray stripe enclosing two rows of yellowish dots and bordered on each side by a yellowish-white stripe.

Type locality. Male holotype from Canal Zone Biological Area, July, 1936. No paratypes.

Balmaceda picta Peckham, 1894

Figures 42–44

B. picta Simon, 1903
B. picta F. Cambridge, 1901
B. picta Petrunkevitch, 1911

The Peckhams had two males and a female from Guatemala. This is the first record from Panama. Since no adequate treatment of the species has ever been published, I have thought it desirable to give here a detailed description of the female. The spider in the Museum of Comparative Zoölogy from Turrialba, Costa Rica (N. Banks Collection) and labelled *Marpissa minor* Cb. is this species. I also believe that the pair of spiders from the Peckham collection labelled *Balmaceda modesta* (Taczanowski) is not a Balmaceda but a Breda as once suggested by the Peckhams. Among other important characters in these specimens are: four promarginal teeth and a single simple tooth on the retromargin of the fang groove; reduction of spines on the legs.

Female hypotype. Total length 7.36 mm. Carapace 2.88 mm. long, 2.11 mm. wide a short distance behind PLE which occupy three fourths of width of carapace at their level, 1.02 mm. tall and, therefore, slightly less than one half as tall as wide, rises gently from AME to PLE, then descends gently to steep posterior declivity which begins at about two thirds of distance from PLE to posterior border (Fig. 42); with no long hair but much short hair as noted later, black bristles present in eye area but special tufts appear to be lacking though they may have been removed in handling; a short median longitudinal thoracic groove about halfway from opposite posterior border of PLE to beginning of steep posterior declivity, lying in a shallow median depression.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of AME and ALE are almost level. Anterior row wider than posterior row in ratio of 25 : 23. Quadrangle of laterals wider than long in ratio of 25 : 17. Total eye space occupies four ninths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 22 : 11 : 2.5 : 11. AME separated from one another by one fourteenth of their diameter, from ALE by slightly more. Middle eyes closer to ALE than to PLE in ratio of about 7 : 8. Height of clypeus equal to about one seventh of the diameter of AME. Clypeus decorated with both simple and clavate white hairs and the usual three bristles in lower angle between AME. White hair also in a patch below each ALE.

Chelicerae. Parallel, vertical, somewhat gibbous in middle in front, basal segment .58 mm. long. Fang fairly robust, evenly curved. Fang groove with two small promarginal teeth and a single, moderately robust fissidentate tooth on retromargin (Fig. 43).

Maxillae. Parallel, longer than wide in middle in ratio of about 2 : 1 (largely hidden by first coxae), not deeply notched in middle along outer margin, outer distal corner well rounded, with no tubercle.

Lip. Longer than wide in ratio of 11 : 9, also partly hidden by enlarged first coxae. Sternal suture straight.

Sternum. Longer than wide in ratio of 29 : 18, widest between third coxae, anterior end much narrower than base of lip, posterior end blunt and not extended between fourth coxae which are separated by about one fourth their diameter.

Legs. 4312. Tibial index of first leg 21, of fourth leg 11.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.41	.90	.96	.76	.45	4.48
2.	1.28	.83	.90	.76	.50	4.27
3.	1.47	.70	.96	.96	.53	4.62
4.	1.58	.83	1.41	1.15	.60	5.57

First pair of legs considerably enlarged, especially the coxae, femora, patellae, and tibiae. Posterior coxae somewhat elongated. No fringes on legs but considerable long light colored hair on palps.

Spines. First leg: femur dorsal 0–1–1–1, prolateral 0–0–1–2; patella 0; tibia only prolateral 0–1 (offset ventrally), ventral 2–2–2; metatarsus only ventral 2–2. Second leg: femur and patella as in first; tibia only ventral 1r–2–1p; metatarsus 2–2. Third leg: femur dorsal 0–1–1–1, prolateral 0–0–0–2, retrolateral 0–0–0–1; patella 0; tibia only ventral 0–0–1p; metatarsus prolateral 0–1, ventral 0–2, retrolateral 0–2. Fourth leg: femur dorsal 0–1–1–1, prolateral 0–0–1 (small), retrolateral 0–0–1; patella 0; tibia as in third; metatarsus only ventral 0–1.

Abdomen. Elongate, quite pointed at posterior end, longer than wide in ratio of 17 : 8, widest about two fifths from base. Anal tubercle a somewhat elongated cone. All six spinnerets nearly equal in length, anterior pair quite stout, position of colulus indicated by tuft of stiff hairs. Tracheal spiracle at base of spinnerets.

Epigynum. A rather small epigynal plate; very slightly notched in posterior margin. Several spermathecae and associated tubules just in front of posterior margin. Anterior two fifths of plate a smooth yellowish-white part bounded posteriorly by two short curved lines meeting in the center (Fig. 44).

Color in alcohol. Carapace: generally a rich reddish light brown; white hairs on clypeus and around eyes as already noted; eyes on black spots; considerable white appressed hair over dorsal region, black clavate hairs over lateral sides and posterolateral corners, the light reddish brown continues medially from dorsal region to posterior

border thus making an indefinite stripe; a narrow white marginal stripe of clavate hairs. Sternum yellowish-white dusted with gray. Legs and palps unicolorous yellow with a few brownish spots. Abdomen: a short brownish basal sagittate stripe enclosed in a light, central stripe much serrated marginally extending whole length of abdomen; lateral sides brownish; yellowish spotted with brownish ventrolaterally; venter yellowish-white.

Type locality. Female hypotype from Canal Zone Biological Area. June-July, 1934. Another female from the same locality, Aug., 1939,

Balmaceda reducta spec. nov.

Figures 45–47

Female holotype. Total length 6.02 mm. Carapace 2.69 mm. long, 2.18 mm. wide somewhat behind PLE which occupy about two thirds of width of carapace at their level, 1.09 mm. tall and, therefore, half as tall as wide (broader than usual in the genus), gently inclined to PLE, only slightly depressed behind PLE until posterior declivity which begins about five eighths of distance from PLE to posterior border; lateral sides considerably rounded; with a median longitudinal thoracic groove of moderate length only a short distance behind PLE (Figs. 45–46). A tuft of four stiff black bristles somewhat behind ALE and two shorter similar bristles immediately behind ALE.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of ALE and AME are level with one another. Anterior row wider than posterior row in ratio of 11 : 10, wider than middle row in ratio of 22 : 19. Quadrangle of laterals wider than long in ratio of 11 : 7. Total eye space occupies thirty-five eighty-thirds of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 21 : 11 : 2.75 : 10. AME separated from one another by one fifteenth of their diameter, from ALE by one tenth of their diameter. Middle eyes slightly closer to ALE than to PLE. Height of clypeus equal to one tenth of the diameter of AME. Clypeus decorated with a rich growth of white hairs, a few long white bristles, and three long upturned, brownish bristles in lower angle between AME. A brush of white hairs appears prominently beneath ALE.

Chelicerae. Parallel, vertical, moderately robust, somewhat swollen obliquely near base, with a few white lanceolate hairs on basal half in front. Fang fairly robust, evenly curved. Fang groove distinct; promargin with two teeth, innermost small; retromargin with a fairly robust fissidentate tooth.

Maxillae. Parallel, longer than wide in middle in ratio of about 7 : 3 (obscured by obtrusion of first coxae), outer border only moderately notched in middle, outer distal corner rounded, with no tubercle or hook.

Lip. Partly hidden by enlarged first coxae; probably longer than wide in ratio of about 11 : 9; without special modifications.

Sternum. Longer than wide in ratio of 55 : 40, considerably narrower at anterior border; anterior coxae only separated by one third their diameter; only slightly convex; widest at interval separating second and third coxae; posterior end bluntly rounded and not extended between fourth coxae which are separated by about one third of their diameter.

Legs. 4132. Tibial index of first leg 31, of fourth leg 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.28	.96	.83	.64	.45	4.16
2.	1.09	.83	.70	.58	.45	3.65
3.	1.09	.64	.77	.83	.51	3.84
4.	1.34	.70	1.15	.90	.52	4.61

All legs moderately hairy especially on the three most proximal segments.

Spines. First leg: femur only dorsal 0–1–1–1, prolateral 1–2 (all near distal end; patella 0; tibia only prolateral 0–1–0, and ventral 2–2–2; metatarsus only ventral 2–2, all ventral tibial and metatarsal ventral spines long and robust, the first pair of metatarsals being nearly as long as the segment. Second leg: femur and patella as in first except only two femoral prolaterals near distal end; tibia and metatarsus as in first except they are shorter. Third leg: femur and patella as in second; tibia only ventral 0–0–2, with promarginal lacking on left; metatarsus only prolateral 0–1, retrolateral 0–1, ventral 0–2. Fourth leg: femur dorsal 0–1–1–1, retrolateral one near distal end; patella 0; tibia only ventral 0–0–1p; metatarsus only ventral 0–2.

Abdomen. Ovoid, somewhat flattened; longer than wide in ratio of about 2 : 1; widest near middle; anal tubercle a somewhat flattened cone with a tuft of white hairs; six spinnerets of moderate length and without modifications; position of colulus indicated by a dispersed group of long black hairs; trachael spiracle near base of spinnerets, with an obscure lip but without tubercle.

Color in alcohol. Carapace: generally reddish brown but with yellowish-white hair extending in streaks especially from dorsal postocu-

lar area; eyes on black spots; beneath ALE are tufts of yellowish-white hair. Legs with many yellowish and reddish brown bars dorsally, all lighter beneath. Chelicerae reddish brown; maxillae and lip lighter with yellowish-white tips. Sternum brownish. Abdomen: a broad, much indented and broken yellowish-white stripe extends dorsally from base to near posterior end; lateral sides with broad oblique brown bands, one of which reaches dorsally to divide the dorsal light stripe into anterior and posterior halves; venter nearly uniformly yellowish with a faintly outlined broad median darker stripe.

Epigynum. A rather large epignyal plate, wider than long in ratio of about 5 : 4; with a moderately deep posterior marginal notch; anterior part of plate with a depression of moderate depth containing two slightly raised areas with procurved posterior margins; two spermathecae and associated tubules show through chitinous wall in posterior half (Fig. 47).

Type locality. Female holotype from Canal Zone Forest Reserve, C. Z., July, 1939. No paratypes.

Balmaceda turneri spec. nov.

Figures 48–51

Female holotype. Total length 7.10 mm. Carapace 3.13 mm. long, 2.11 mm. wide a short distance behind PLE which occupy twenty-five thirty-firsts of width of carapace at their level, 1.04 mm. tall and, therefore, almost exactly half as tall as wide (Figs. 48–49); form essentially as in B. picta Peckham, also true of hair and bristles; a short median longitudinal thoracic groove a little more anterior in position than in B. picta and carapace less depressed in its vicinity.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one eighth of diameter of AME; anterior row only slightly wider than posterior row. Quadrangle of laterals wider than long in ratio of 25 : 18. Total eye space occupies eleven twenty-fourths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 24 : 11 : 2.5 : 11. AME only slightly separrated from one another, from ALE by one eighth of their diameter. Middle eyes closer to ALE than to PLE in ratio of about 8 : 9. Height of clypeus equal to one twelfth of the diameter of AME. Clypeus decorated only by a weak ventral fringe of long white hair, a few long white hairs elsewhere and the usual three long bristles in lower angle between AME.

Chelicerae. Parallel, vertical, very slightly gibbous in front in middle, basal segment .77 mm. long. Fang of moderate size and evenly curved. Fang groove with two promarginal teeth and a single fissidentate type of retromarginal tooth (Fig. 50).

Maxillae. Parallel, apparently as in *B. picta* but largely hidden by enlarged and nearly contiguous first coxae.

Lip. Apparently as in *B. picta* but largely hidden by first coxae.

Sternum. Very narrow at anterior end, longer than wide in ratio of 31 : 18, widest between third coxae, posterior end blunt and not extended between fourth coxae which are nearly contiguous.

Legs. 4132. Tibial index of first leg 20, of fourth leg 13. First leg considerably enlarged as in B. picta. No fringes on legs.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.34	1.02	.94	.77	.45	4.52
2.	1.21	.89	.78	.66	.44	3.98
3.	1.41	.70	.90	.90	.58	4.49
4.	1.66	.96	1.47	.98	.64	5.71

Spines. First leg: as in *B. picta.* Second leg: as in B. picta except tibia ventral 2–2–2 on left and 1r–2–2 on right. Third leg: femur and patella as in B. picta except femur prolateral 0–0–1–2; tibia prolateral 0–0–1–0, ventral 0–0–2, retrolateral 0–0–1–0; metatarsus prolateral and retrolateral 0–2, ventral 0–1. Fourth leg: femur only dorsal 0–1–1–1, and prolateral 0–0–0–1; patella 0; tibia only ventral 0–0–2; metatarsus only prolateral 0–1, ventral 0–1.

Abdomen. Elongate ovoid, just a little more than twice as long as wide, widest about two fifths from base, other features essentially as in B. picta.

Epigynum. Epigynal plate broadly notched in posterior border; several spermathecae and associated tubules showing from within for a considerable distance in front of marginal notch; two somewhat depressed areas separated by a broad low septum occupies anterior two fifths of plate (Fig. 51).

Color in alcohol. Carapace: numerous short recurved black bristles and long black bristles around eyes; interocular area rich reddish brown with surface finely granulate, much lighter behind eyes and through first half of steep declivity; eyes on black spots; lateral and dorsolateral regions thickly covered with short black hair; a white marginal line from posterolateral angles to opposite PLE, then it is continued to clypeus by merely a white fringe. Sternum yellowish,

irregularly spotted with brown. All legs and palps unicolorous yellowish obscurely spotted with pale brown. Abdomen: a broad central light stripe extends from base to tip of posterior spinnerets, bordered with dark brown and serrated, especially in posterior half; a fairly broad dorsolateral brown stripe on each side extends from base to tip of spinnerets; remainder of abdomen a clear yellowish-white.

Type locality. Female holotype from Porto Bello, R. P., August, 1936. No paratypes.

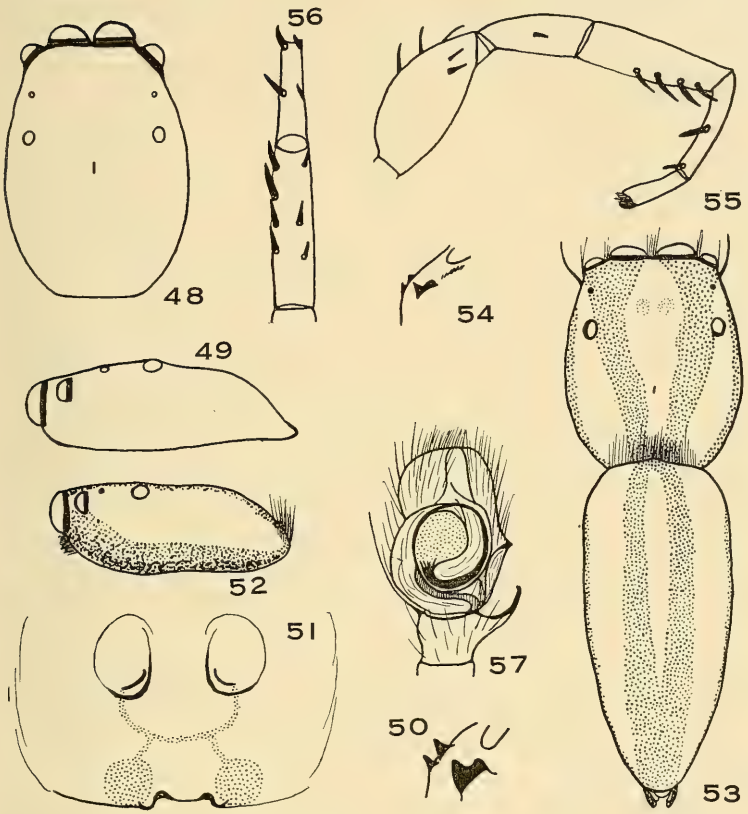
Mabellina gen. nov.

Carapace low, fairly broad, moderately rounded laterally, nearly flat in interocular region, with a very short median longitudinal thoracic groove about one third of the distance from PLE to steep posterior declivity. *Eyes:* anterior row moderately recurved; PME considerably closer to ALE than to PLE; PLE occupy about nine elevenths of width of carapace; anterior row slightly wider than posterior row; quadrangle of laterals nearly twice as wide as long; total eye space occupies a little less than half the length of carapace. *Clypeus* rather low. *Chelicerae* of moderate size, slightly produced. Retromargin of fang groove with an obscurely fissidentate tooth. *Maxillae* slightly convergent, unmodified. *Sternum* considerably narrowed between first coxae; anterior border about as wide as base of lip. *Legs:* 1423; first pair considerably enlarged, especially coxa, femur, patella, and tibia; leg spines in general somewhat reduced in number; first tibiae with four ventral spines on promargin and three on retromargin, with promarginal series occupying distal two thirds of segment. *Abdomen* elongate ovoid; spinnerets of moderate size. *Genotype: Mabellina prescotti* sp. nov.

Mabellina prescotti spec. nov.

Figures 52-57

Male holotype. Total length 4.92 mm. Carapace 1.98 mm. long, 1.54 mm. wide at some distance behind PLE which occupy about nine elevenths of width of carapace at their level, .83 mm. tall and, therefore about .54 as tall as wide (Figs. 52–53); moderately well rounded laterally, nearly flat in interocular area; descent from PLE slight until posterior steep declivity is reached which begins about five sevenths of the distance from PLE to posterior border; white lanceo-



External Anatomy of Spiders

Figs. 48–49. *Balmaceda turneri* Chickering; carapace, dorsal and lateral views.
Fig. 50. *B. turneri* Chickering; cheliceral teeth.
Fig. 51. *B. turneri* Chickering; epigynum, ventral view.
Fig. 52. *Mabellina prescotti* Chickering; carapace, lateral view.
Fig. 53. *M. prescotti* Chickering; whole body, dorsal view.
Fig. 54. *M. prescotti* Chickering; cheliceral teeth.
Fig. 55. *M. prescotti* Chickering; first leg, lateral view.
Fig. 56. *M. prescotti* Chickering; first tibia and metatarsus, ventral view.
Fig. 57. *M. prescotti* Chickering; male palp, ventral view.

late hair in stripes to be noted later, and a moderate amount of simple hair; a single large black bristle considerably below PME; at posterolateral angle is a tuft of erect white hair meeting a corresponding tuft from the abdomen; a very short median longitudinal thoracic groove about one third of the distance from PLE to posterior border.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one sixteenth of the diameter of AME. Anterior row wider than posterior row in ratio of 55 : 53, wider than middle row in ratio of 55 : 48. Quadrangle of laterals wider than long in ratio of 11 : 6. Total eye space occupies about four ninths the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 17.5 : 6 : 1.75 : 6.5. AME separated from one another by one twelfth of their diameter, from ALE by one eighth of their diameter. Middle eyes closer to ALE than to PLE in ratio of about 7 : 10. Height of clypeus equal to about one third of diameter AME (exact outlines hidden by white hair). Clypeus decorated with a rich covering of long white lanceolate hair which does not quite reach lower border of AME but covers basal third of chelicerae, a single long white bristle beneath outer border of AME, and apparently only two long yellowish bristles in lower angle between AME.

Chelicerae. Vertical, parallel, slightly modified, flattened considerably in front with lateral margins strongly chitinized; basal third with many short lanceolate hairs in front; basal segment .65 mm. long, basal boss not observed; distal half with a large reddish brown spot in front. Fang robust in basal half, remainder of moderate size, fairly evenly curved. Fang groove distinct; promargin with two very small teeth at inner end; retromargin with a single low and somewhat obscurely fissidentate tooth (Fig. 54).

Maxillae. Slightly convergent, longer than wide in middle in ratio of about 2 : 1, only moderately concave in middle of outer border; moderately swollen along middle of retrolateral surface, outer distal corner well rounded, without tubercle or hook.

Lip. Longer than wide in ratio of 16 : 13, basal excavations reach a little more than one third of length of organ; reaches a little beyond middle of maxillae, distal border well rounded. Sternal suture straight.

Sternum. Elongate scutiform; longer than wide in ratio of 38 : 27; anterior coxae separated by one half the greatest width of sternum; anterior border about as wide as base of lip; quite strongly convex; posterior end blunt, not extended between fourth coxae which are separated by one third of their diameter. First coxae much enlarged.

Legs. 1423. Tibial index of first leg 17, of fourth leg 16. First leg

considerably enlarged, especially coxa, femur, patella, and tibia (Fig. 55). Only a moderate amount of hair and no special fringes or tufts.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.47	.96	1.34	.96	.50	5.23
2.	.96	.58	.70	.66	.36	3.26
3.	.96	.51	.54	.64	.36	3.01
4.	1.02	.51	.70	.70	.36	3.29
Palp	.66	.26	.16	—	.51	1.59

Spines. First leg: femur only dorsal 0–0–1–1–1, prolateral 0–0–2–0; patella only prolateral 0–1–0; tibia only ventral 0–2–2–1p–2 (last pair not terminal), not well matched, with promarginal series occupying distal two thirds of segment, retromarginal series the distal three fourths; metatarsus only ventral 0–2–2 (Fig. 55); promarginal spines of both tibia and metatarsus large while those of retromarginal series are reduced in size (Fig. 56). Second leg: femur as in first; patella 0; tibia only ventral 0–1r–2–2; metatarsus only ventral 0–2–2. Third leg: femur as in first except retrolateral distal 1; patella 0; tibia prolateral 0–1–0, retrolateral 0, ventral 0–0–2 on right, 0–0–1r on left; metatarsus prolateral 0–2, retrolateral 0–1. ventral 0–1. Fourth leg: femur only dorsal 0–1–1–1; patella 0; tibia only ventral 0–0–1p; metatarsus as in third on right, broken on left. Palpal spines: only femur dorsal 0–0–1–1.

Palp. Femur slightly bent; patella and tibia short, with latter about two thirds as long as former; tibial apophysis a long retrolateral spur which projects laterally but is turned downward near its tip, broad at base but slender distally; bulb about as wide as long; embolus arises near center of bulb, describes a complete circle and about a semicircle again to terminate as a very slender filament near anterior border of bulb; at base on retrolateral side is a deep oval depression in the cymbium (Fig. 57).

Abdomen. Longer than wide in ratio of 9 : 4, anal tubercule a short, somewhat flattened cone with a tuft of white hairs; at anterior border in middle is a group of erect black bristles and at each anterodorsal corner is a tuft of erect white hairs; six spinnerets of moderate length, closely crowded together, anterior pair the stoutest, posterior pair nearly twice as long as anterior pair; position of reduced colulus indicated by a tuft of black hairs; tracheal spiracle near base of spinnerets, with distinct lip but no tubercle.

Color in alcohol. With a very striking color pattern. Carapace: with

seven stripes; a central dorsal narrow yellowish-white stripe from AME to near posterior border, on each side of this central stripe is a rather narrow reddish brown stripe from AME to posterior border, the two converge in vicinity of thoracic groove, on each side a broad white stripe covered with lanceolate hair from ALE nearly to posterior border, finally on each side a bright reddish brown marginal stripe from AME to posterior border; many pale rust-red hairs between ALE (Fig. 53). Palps yellowish-white. Chelicerae: yellowish-white, streaked with reddish brown and with the frontal spot already noted. Maxillae and lip reddish brown with whitish tips. Sternum and all coxae clear yellowish-white, first coxae with a small reddish brown prolateral and retrolateral spot. Legs: first pair with yellowish-white tarsi, metatarsi the same with a short distal retrolateral reddish brown stripe, tibiae reddish brown with a prolateral and retrolateral yellowish-white spot occupying most of the central area, patellae reddish brown with an incomplete dorsal yellowish stripe and a retrolateral distal spot of the same color, femora reddish brown with dorsal and retrolateral yellowish-white stripes; other legs unicolorous yellowish-white. Abdomen: a slender central yellowish-white stripe between two narrow reddish brown stripes which begin together at base and unite again near posterior end; a broad white dorsolateral stripe covered with white lanceolate hairs extends on each side the entire length of abdomen; lateral sides and venter behind genital groove unicolorous bright reddish brown with numerous scattered white lanceolate hairs (Fig. 53); anterior and posterior pairs of spinnerets also reddish brown.

Type locality. Male holotype from Canal Zone Biological Area, July, 1939. One male paratype, El Valle, R. P., July, 1936.

Genus Rudra Peckham, 1885

Rudra geniculata Peckham, 1885

Rudra geniculata Peckham, 1894.
R. geniculata F. Cambridge, 1901.
R. geniculata Simon, 1903.
R. geniculata Petrunkevitch, 1911.
R. geniculata Banks, 1929.

Mr. Banks ('29) stated that a male of this species was taken in the Canal Zone Biological Area, June, 1924, but the vial now contains a female. I have one immature male which very closely resembles the female, Canal Zone Biological Area, June, 1936. The hypotype female

should be very carefully described since the adult male remains unknown. I also have two females from the locality cited above, June–July, 1939.

Note: I have one specimen, an immature male, from El Valle, R. P., July, 1936, which undoubtedly represents a new species. I do not consider it a good practice to describe a new species from an immature specimen, hence I merely note it here and await the collection of mature specimens by myself or others.

Thiodina Group

Key to the genera in the Thiodina Group

1. Anterior tibiae with special ventral sensory hairs (varying from a single one to two pairs, lacking in one species referred to the genus Banksetosa) .2
1. Anterior tibiae without special ventral sensory hairs 4
2. Small spiders, usually not much more than six mm. long; with moderately low carapace; retromargin of fang groove with a single simple tooth; with two pairs of ventral bulbous sensory hairs on anterior tibiae; total eye space occupies a little more than half the length of carapace..... *Cotinusa*, (p. 90)
2. Not with combination of characters given above 3
3. Small spiders, usually not much over five mm. long; with moderately low carapace; retromargin of fang groove with a fissidentate tooth or two small teeth close together; with a single special ventral sensory hair or a pair of these on anterior tibiae (lacking in one species); total eye space occupies less than half the length of carapace.....*Banksetosa*, (p. 78)
3. Size very variable, but usually larger, up to ten mm. long; carapace of moderate height; retromargin of fang groove with variable number of teeth, most commonly three or four; with two pairs of special ventral sensory hairs on anterior tibiae; total eye space occupies half or less than half the length of carapace.....*Thiodina*, (p. 106)
4. Abdomen with a series of three broad red bars and four grayish bars alternating; carapace much longer than wide; total eye space occupies slightly more than half the length of carapace; sternum much narrowed in front *Psecas*, (p. 99)
4. Not with combination of characters given above 5
5. First tibiae with four pairs of ventral spines; chelicerae strongly developed in male, not so in female; carapace slopes quite steeply in males from PLE to posterior border, less abruptly in females ....*Scopocira*, (p. 103)
5. Not with combination of characters given above 6
6. Middle eyes closer to ALE than to PLE; anterior row of eyes about equal in width to that of posterior row; retromargin of fang groove with a row of six teeth of moderate size.....*Albionella*, (p. 74)
6. Not with combination of characters given above 7

7. Middle eyes closer to PLE than to ALE; anterior row of eyes slightly wider than posterior row; retromargin of fang groove with a row of three teeth, the most medial a fissidentate tooth; total eye space occupies a little more than half the length of the carapace..... *Toloella*, (p. 106)
7. Middle eyes considerably closer to ALE than to PLE; anterior row of eyes slightly wider than posterior row; retromargin of fang groove with two or three small teeth; total eye space occupies a little less than half the length of carapace..... *Carabella*, (p. 86)

Albionella gen. nov.

Carapace moderately high and moderately broad; lateral sides moderately rounded; considerably arched dorsally from AME to posterior declivity; with a short median longitudinal thoracic groove a short distance behind PLE. *Eyes:* anterior row considerably recurved; PME somewhat closer to ALE than to PLE; PLE occupy about six sevenths of width of carapace; anterior and posterior row about equal in width; quadrangle of laterals distinctly wider than long; total eye space occupies more than half the length of carapace. *Clypeus* moderately low. *Chelicerae:* of moderate size; parallel, vertical; retromargin of fang groove with six teeth of moderate size. *Maxillae* parallel, unmodified. *Sternum* broad, widest between second coxae, but not much narrowed between first coxae. *Legs:* 4132; first leg not enlarged; without fringes; leg spines present in moderate number. *Spinnerets* of moderate size. Genotype: *Albionella propria* spec. nov.

Albionella propria spec. nov.

Figures 58–61

This genus appears to be closely related to Scopocira, but only females are yet available from which to judge.

Female holotype. Total length 3.46 mm. Carapace 1.60 mm. long, 1.20 mm. wide opposite PLE which occupy twenty-four twenty-sevenths of width of carapace at their level, .82 mm. tall and, therefore, .68 as tall as wide; ascent gradual from AME to PLE, then a gradual drop to steep posterior declivity which begins a little more than halfway from PLE to posterior border; cephalic part with vertical lateral sides and gradually rounded from behind ALE to posterolateral corners; with a short broad longitudinal median thoracic groove just a short distance behind PLE which lie in a depression of considerable depth (Figs. 58–59). With a moderate amount of light hair a tuft

of which is erect just below beginning of steep posterior declivity. Also with a few long slender bristles in ocular area.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one eighth of diameter of ALE. Anterior row and posterior row equal in width, both wider than middle row in ratio of 47 : 42. Quadrangle of laterals wider than long in ratio of 47:37. Total eye space occupies slightly more than four sevenths of the length of carapace. Ratio of eyes AME : ALE : PME : PLE = 17 : 8 : 2 : 8.5. AME barely separated from one another, from ALE by one sixteenth of their diameter. Middle eyes closer to ALE than to PLE in ratio of about 7 : 10. Height of clypeus equal to three sixteenths of the diameter of AME. Clypeus decorated only with a well developed ventral fringe of white hairs, three bristles in lower angle between AME, the upper of these bristles is very long and turned upward as far as dorsal boundaries of AME, the other two are much shorter and only slightly turned upward.

Chelicerae. Vertical, parallel, with basal segment .45 mm. long, moderately swollen in front obliquely across from medial basal angle to outer distal angle. Fang of moderate size, evenly curved. Fang groove distinct; promargin with five small teeth all near medial end of groove; retromargin with six teeth of moderate size with their bases contiguous (from certain angles they appear to be united) (Fig. 60).

Maxillae. Parallel, longer than wide in middle in ratio of about 5 : 3; only slightly concave in middle of outer border; distal border rounded and continuous with outer lateral boundary with no tooth or hook at outer distal corner; with well developed scopula along truncature.

Lip. Slightly wider than long; basal excavations reach slightly less than one third of organ; reaches to middle of maxillae. Sternal suture straight.

Sternum. Scutiform; longer than wide in ratio of 29 : 25; widest between second coxae; anterior border slightly wider than base of lip; anterior coxae sixteen twenty-fifths as wide apart as greatest width of sternum; posterior end broadly rounded and not extended between fourth coxae which are separated by seven elevenths of their diameter. First coxae somewhat the stoutest.

Legs. 4132. Tibial index of first leg 17, of fourth leg 14. All legs with a moderate amount of simple hair and white lanceolate hair, but with no fringes or special tufts. Palps with well developed fringes on prolateral and retrolateral sides of patellae, tibiae, and tarsi, especially long on prolateral side of tibiae.

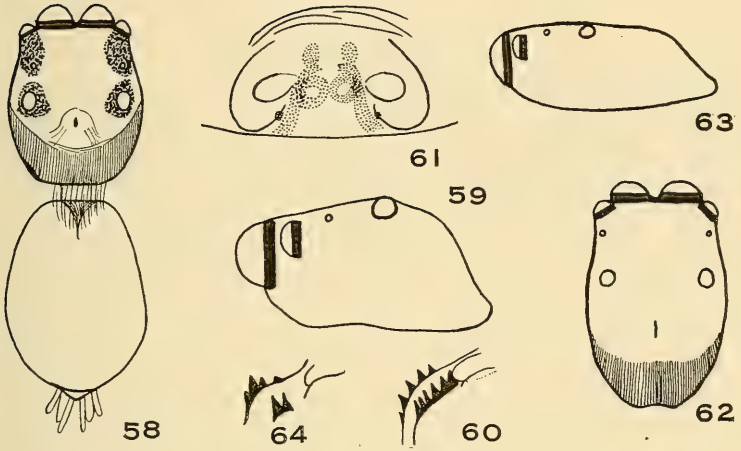
	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.90	.53	.60	.40	.33	2.76
2.	.80	.47	.50	.40	.32	2.49
3.	.83	.44	.50	.53	.32	2.62
4.	.93	.43	.67	.63	.38	3.04

Spines. First leg: femur only dorsal 0–1–1–1 and prolateral distal 1; patella 0; tibia only ventral 2–2–2, last pair not terminal and first pair near base; metatarsus only ventral 2–2. Second leg: femur and patella as in first; tibia as in first except prolateral 0–0–1; metatarsus as in first. Third leg: femur dorsal 0–1–1–1, prolateral 0–0–0–2, retrolateral distal 1; patella 0; tibia prolateral 0–0–1?, retrolateral 0–1–1–0, ventral 1p–0–0; metatarsus prolateral 1–2, retrolateral 1–1, ventral 0–2. Fourth leg: femur dorsal 0–1–1–1, prolateral 0–0–0–1; patella 0; tibia as in third; metatarsus prolateral 0–1, retrolateral 1–1; ventral 0–2. Palpal spines: none observed.

Abdomen. 1.74 mm. long; longer than wide in ratio of 27 : 19; widest about three-fifths from base; mildly bilobate at base where there is a group of stiff bristles; anal tubercle a short broad cone; six spinnerets of moderate length, rather slender, anterior pair the stoutest, approximated at bases, middle pair slightly the longest; position of colulus indicated by small tuft of stiff, dark colored bristles; tracheal spiracle near base of spinnerets, with distinct lip and what appears to be a low tubercle (somewhat doubtful because of faulty preservation in this region); a tuft of stiff bristles at base.

Epigynum. Rather large; considerably wider than long; at posterolateral corners are curved boundaries; near middle of plate on each side about two diameters of one of them apart is a pair of shallow depressions (Fig. 61).

Color in alcohol. Carapace: generally light brown; eyes on black spots; with many slender white hairs; a narrow black line follows ventral margin together with a much broader stripe of irregular dark brown spots which become more distinct toward anterior end; a broken stripe of irregular small brown spots from posterior steep declivity to opposite PME in about the middle of lateral sides. Palps yellowish-white with femora and coxae dusted with dark brown. Chelicerae, maxillae, and lip amber colored. Sternum a clear light amber. Legs: yellowish; first two pairs with few dark spots; third and fourth with many spots and bands. Abdomen: dorsum yellowish with many small brownish spots, especially numerous on either side at posterior end; lateral sides brownish with small yellowish dots; venter yellowish-



External Anatomy of Spiders

Figs. 58–59. *Albionella propria* Chickering; whole body, dorsal view, and carapace, lateral view.
Fig. 60. *A. propria* Chickering; cheliceral teeth.
Fig. 61. *A. propria* Chickering; epigynum, ventral view.
Figs. 62–63. *Banksetosa dubia* Chickering; carapace, dorsal and lateral views.
Fig. 64. *B. dubia* Chickering; cheliceral teeth.

white with a few small brownish spots especially around tracheal spiracle.

Type locality. Female holotype from Canal Zone Biological Area, August, 1939. No paratypes.

Banksetosa gen. nov.

Carapace fairly low, rather long, with lateral sides only moderately rounded; moderately flat dorsally, with a median longitudinal thoracic groove of moderate length about halfway from PLE to posterior declivity. *Eyes:* anterior row moderately recurved; PME somewhat closer to ALE than to PLE; PLE occupy about seven eighths of total width of carapace; anterior row slightly wider than posterior row; quadrangle of laterals much wider than long; total eye space occupies about two fifths of length of carapace; *Clypeus* low. *Chelicerae* small, parallel, vertical; retromargin of fang groove with a fissidentate tooth or two small teeth. *Maxillae* parallel, unmodified. *Sternum* quite convex, only slightly narrowed between first coxae; widest between second coxae. *Legs:* 4123 or 1432 in male, 4132 in female; first pair moderately thickened; leg spines reduced in number and size; sometimes either a single special sensory hair or a pair of these on ventral side of first tibiae similar to those in several species of Cotinusa. *Abdomen:* elongated and slender; spinnerets of moderate size, unmodified. Male palps appear to show close relationship to those of Cotinusa. *Genotype: Banksetosa dubia* sp. nov.

The two kinds of males at present referred to this genus may be separated by the following key:

Key to the species of Banksetosa

1. Palp with dorsal process of retrolateral tibial apophysis widened and flattened distally; clypeus decorated only with ordinary bristles..... *B. notata*, (p. 81)
1. Palp with dorsal process of retrolateral tibial apophysis not widened and flattened distally; clypeus with a ventral white fringe.. *B. dubia*, (p. 78)

Banksetosa dubia spec. nov.

Figures 62–66

Male holotype. Total length 4.74 mm. Carapace 2.01 mm. long, 1.28 mm. wide at widest place, some distance behind PLE; dorsal

margins of cephalic part and first part of thoracic region nearly parallel; .70 mm. tall and, therefore, about seven thirteenths as tall as wide; with a short longitudinal median thoracic groove which begins about one third of distance from posterior border of PLE to posterior border of carapace (Figs. 62–63).

Eyes. Anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one ninth of diameter of AME. Anterior row wider than posterior row in ratio of 50 : 47. Middle row narrower than posterior in ratio of 44 : 47. Quadrangle of laterals wider than long in ratio of 25 : 16. Total eye space occupies about four ninths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 18 : 6 : 2 : 7. AME separated from one another by one eighteenth of their diameter, from ALE by slightly more. Middle row closer to ALE than to PLE in ratio of about 2 : 3. Height of clypeus equal to one twelfth of diameter of AME. Clypeus decorated with a ventral fringe of coarse white hairs, a few white hairs just below AME, and three bristles in lower angle between AME which are surrounded by dull yellowish hairs.

Chelicerae. Vertical, essentially parallel, outer margins ridged and strongly chitinized, moderately produced, with basal segment .53 mm. long, somewhat swollen in front from medial basal corner to outer distal corner, with a few short hairs on front surface. Fang moderately slender and evenly curved. Fang groove slightly excavated; with four promarginal teeth closely approximated; the retromargin has a single fissidentate tooth with two sharp cusps which from certain angles appear to be two closely approximated (Fig. 64).

Maxillae. Parallel, longer than wide in middle in ratio of about 22 : 9, outer margin acutely notched in middle, palp inserted in basal half, moderately dilated distally, outer distal angle well rounded. Scopula well developed along truncature and a part of medial edge.

Lip. Slightly longer than wide, basal excavations reach about two fifths of length, widest at level of distal ends of basal excavations from which level organ narrows until near distal end it is five twelfths as wide as at widest place, moderately rounded distally and guarded by a small group of black bristles. Sternal suture gently procurved.

Sternum. Quite convex, elongate scutiform, longer than wide in ratio of 5 : 3, widest between second coxae, narrowed anteriorly to width of base of lip, posterior end blunt and not extended between fourth coxae which are separated only by three elevenths of their diameter.

Legs. 1432. Tibial index of first leg 16, of fourth leg 14. First leg

considerably enlarged, especially the femur which is strongly arched dorsally, and patella and tibia. Black hair on ventral side of first patella and tibia may be remains of a fringe. On the ventral surface of the left anterior tibia is a single sensory hair somewhat like those in Cotinusa and related genera, but on the right tibia there appears to be a pair of these. There are differences between these sensory hairs and those better known in related genera which may indicate a fundamental difference in function. Here the hairs seem not to be enlarged except close to their origin and they are also shorter than those in Cotinusa and Thiodina.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.10	.64	.88	.51	.40	3.53
2.	.90	.57	.61	.46	.38	2.92
3.	.95	.52	.56	.59	.40	3.02
4.	1.02	.56	.71	.72	.40	3.41
Palp	.60	.22	.13	—	.58	1.53

Spines. First leg: femur only dorsal 0–0–1–1–1, and prolateral distal 2; patella 0; tibia only ventral 0–1r–2–2; metatarsus only ventral 2–2. Second leg: femur and patella as in first; tibia only ventral 1r–1r–1r–2; metatarsus as in first. Third leg: femur as in first except retrolateral distal 1; patella only prolateral 0–1–0; tibia dorsal 0, prolateral 0–1–1, retrolateral 1–1–1, ventral 0–0–2; metatarsus dorsal 0, prolateral 1–2, retrolateral 1–2, ventral 0–1 Fourth leg: femur as in third except prolateral distal 1; patella as in third; tibia only prolateral and retrolateral 1–1–1, ventral 1p–0–2; metatarsus prolateral and retrolateral 1–2, ventral 0–1p–1p. Palpal spines: only femur dorsal 0–0–1.

Palp. Femur slightly curved, with only a few whitish hairs on dorsal surface; a low ventral tubercle; patella and tibia both short, the former longer than the latter in ratio of about 3 : 2; tibia with two retrolateral processes, the dorsal one fairly stout, longer and gently curved dorsally near its tip, the other is shorter, slenderer and curved ventrally at distal end; bulb strongly swollen; embolus originates on prolateral side distal to middle and curves evenly across cymbium to its tip (Figs. 65–66).

Abdomen. Slender, somewhat flattened dorsoventrally, longer than wide in ratio of nearly 3 : 1, covered dorsally with a moderate supply of fairly stiff bristles, anal tubercle a broad somewhat flattened cone; anterior pair of spinnerets most robust, posterior pair only a little less

robust, middle pair surrounded by others, nearly as long as others but slenderest of all. Position of colulus indicated by small tuft of bristles. Position of tracheal spiracle presumed to be indicated by a fold a short distance from base of spinnerets.

Color in alcohol. Palp, chelicerae, and lip generally brownish; tip of palpal tarsus yellowish-white. Maxillae brownish with yellowish tips at truncatures. First leg generally dark brownish, lighter above and nearly black on prolateral and retrolateral sides of femora and tibiae where some iridescence occurs; tarsi yellowish-white. Second leg much like the first except lighter; ventral surfaces of patellae and tibiae yellowish-white as well as both metatarsi and tarsi except proximal end of metatarsus. Third and fourth femora yellowish-white ventrally, brownish elsewhere; third and fourth patellae and tibiae brownish prolaterally and retrolaterally, yellowish-white elsewhere; third and fourth metatarsi and tarsi yellowish-white. Carapace: generally light amber above but becoming nearly black at ventral margin and in cheek region, also on clypeus except for the white hairs there; eyes on black spots except AME; interocular region filled with rounded masses of whitish subchitinous guanin; a poorly defined white stripe on each side from ALE back over and below PME and PLE to posterolateral corners; a spot of white in region of thoracic groove and two narrow stripes down each posterolateral corner to posterior margin (probably much of the white has been removed by handling); sternum yellowish-white. Abdomen: a dark basal spot which continues along lateral sides to posterior end and extends dorsally is overlaid with numerous white hairs; in center of dorsum is a yellowish-white stripe extending through about half the length where a series of alternate short brownish and white bars occurs, the latter being covered with erect white hairs; spinnerets dark, almost black; venter yellowish-white through center to near base of spinnerets where a dark band occurs; nearly black laterally.

Type locality. Male holotype from Boquete, R. P., July, 1939. No paratypes.

Banksetosa notata spec. nov.

Figures 67–72

It is with some hesitation that I have placed this species in the genus Banksetosa, but it seems to rest here more securely than elsewhere unless a new genus is made for it.

Holotype male. Total length 5.38 mm. Carapace 2.30 mm. long, 1.47 mm. wide at some distance behind PLE which occupy twenty-seven

thirty-seconds of width of carapace at their level, .89 mm. tall and, therefore, about .61 as tall as wide; seen in profile, with beginning of steep posterior declivity about seven elevenths of distance from PLE to posterior border (Figs. 67–68); only with few simple hairs and white lanceolate hairs later to be recorded under color; a short median longitudinal thoracic groove about halfway from PLE to beginning of steep posterior declivity.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one twentieth of the diameter of AME. Anterior row wider than posterior row in ratio of 28 : 27, wider than middle row in ratio of 28 : 25. Quadrangle of laterals wider than long in ratio of 56 : 35. Total eye space occupies twenty-three fifty-seconds of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 21 : 9 : 2.5 : 8. AME contiguous and only slightly separated from ALE. Middle eyes closer to ALE than to PLE in ratio of about 3 : 4. Height of clypeus equal to one seventh of the diameter of AME. Clypeus decorated only with bristles as follows: a few ordinary ones along ventral border and elsewhere, a single long one beneath outer border of AME, a single long upturned one in lower angle between AME and two much shorter ones below it.

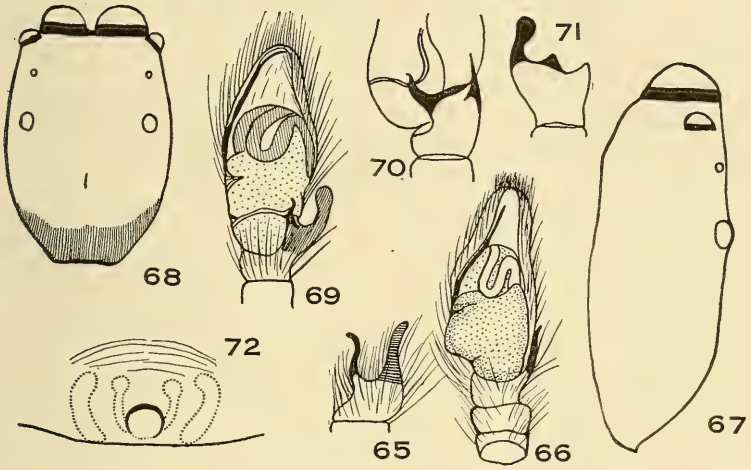
Chelicerae. Rather small, parallel, vertical, with ridge extending from medial border near base obliquely to outer distal angle, basal segment .50 mm. long. Fang moderately robust, evenly curved. Fang groove with three small promarginal teeth close together near medial end; retromargin with two teeth also close together but nearly midway between medial end and base of fang. The two latter appear like a fissidentate tooth when viewed from certain angles.

Maxillae. Parallel, longer than wide in middle in ratio of 5 : 2, moderately notched in middle of outer border, outer distal corner rounded, without tubercle or hook.

Lip. Slightly longer than wide at base, basal excavations reach half the length of the organ, reaches almost three fifths the length of maxillae. Sternal suture straight or slightly procurved.

Sternum. Elongate scutiform, quite convex, highest in the middle, widest between second coxae, anterior coxae separated by width of lip, anterior border as wide as lip at base, posterior end bluntly rounded, not extended between fourth coxae which are separated by one fifth of their diameter.

Legs. 4123. Tibial index of first leg 17, of fourth leg 13. All legs with a moderate supply of simple dark hair, but with no fringes. First leg enlarged much as in Carabella gen. nov.



External Anatomy of Spiders

Figs. 65–66. *Banksetosa dubia* Chickering; male palp, ventral view, and palpal tibia, retrolateral view.

Figs. 67–68. *B. notata* Chickering; carapace, lateral view, and dorsal view, smaller scale.

Figs. 69–71. *B. notata* Chickering; male palp, ventral view, and palpal tibia in retrolateral and dorsal view.

Fig. 72. *B. notata* Chickering; epigynum, ventral view.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.09	.70	.81	.59	.40	3.59
2.	.96	.64	.69	.53	.38	3.20
3.	1.00	.54	.51	.65	.33	3.03
4.	1.15	.58	.78	.91	.35	3.77
Palp	.61	.26	.20	—	.70	1.77

Spines. First leg: femur dorsal 0–1–1–1 (last one lacking on right), prolateral only distal 2 (with a prolateral row of short stiff bristles reaching throughout segment); patella 0; tibia only ventral 0–0–2 (little more than cusps and not terminal); metatarsus only ventral 0–2–2 . Second leg: femur and patella as in first, minus the short stiff bristles; tibia only ventral 0–0–1r–1p (last is terminal); metatarsus as in first. Third leg: femur as in first except retrolateral distal 1; patella only prolateral 0–1–0; tibia prolateral 0–1–1–0, retrolateral the same, ventral 0–0–1p on left and 0–0–2p on right; metatarsus prolateral 0–1, ventral 0–2, retrolateral 1–1. Fourth leg: femur as in third except prolateral distal 1; patella 0; tibia prolateral and retrolateral 0–1–1–0, ventral 1p–0–1p (last is terminal); metatarsus prolateral 0–2, retrolateral 0–1, ventral 0–1. Palpal spines: only femur dorsal 0–0–1.

Palp. Femur only slightly bent dorsally; patella and tibia both short with latter nearly four fifths as long as former exclusive of the apophysis; tibial retrolateral apophysis a massive extension of the segment from which two processes arise, the ventral process strongly chitinized and hooked at apex, the dorsal process also strongly chitinized, but widened and flattened distally, between dorsal process and base of cymbium appears a strongly chitinized tubercle; embolus arises in same position as in Carabella gen. nov. but beneath a membranous flap from which it emerges, turns rather sharply and extends in a sinuous and, perhaps, a spiral course to its termination near distal end of cymbium (Figs. 69–71).

Abdomen. Elongated and nearly cylindrical; longer than wide in ratio of nearly 3 : 1; with two pairs of dorsal sigilla faintly indicated in second fourth from base; covered with numerous brown bristles. Other features essentially as in Carabella gen. nov.

Color in alcohol. Carapace: central region from AME to near posterior border yellowish-white, narrowed opposite thoracic groove and sharply narrowed at steep declivity; interocular area with many large white granules of subchitinous guanin and two clear spots; eyes on black spots; a very narrow incomplete white stripe made by lanceolate hairs from ALE beneath PME to some distance behind

PLE; lateral sides entirely brown. Legs: first pair generally light brown with femora darker and tibia prolaterally the same, and tarsi yellowish-white; second pair much the same as first but lighter; third and fourth pairs generally yellowish-white with femora brown on both lateral sides. Chelicerae deep amber; lip and maxillae lighter amber with whitish tips. Sternum yellowish-white. Abdomen: dorsal central area light brown throughout with a series of subchitinous guanin granules arranged roughly into four pairs of white spots close to middle line, the first pair just behind first pair of dorsal sigilla and last pair just at base of anal tubercle and contiguous with one another; along lateral borders of the dorsal area are four pairs of obscure brownish spots; dorsolateral regions with many small subchitinous guanin granules overlaid with white hairs to make an indefinite stripe on each side; laterally yellowish-white with many very narrow brownish stripes; venter yellowish-white with many white subchitinous guanin granules; spinnerets almost black.

Female allotype. Total length 5.25 mm. Carapace 2.24 mm. long, 1.38 mm. wide at some distance behind PLE which occupy twenty-five twenty-ninths of whole width of carapace at their level, .84 mm. tall and, therefore, almost .61 as tall as wide. Otherwise essentially as in male.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one tenth of diameter of AME. Anterior row wider than posterior row in ratio of 53 : 49, wider than middle row in ratio of 53 : 46. Quadrangle of laterals wider than long in ratio of 53 : 34. Total eye space occupies slightly more than two fifths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 19 : 8 : 3 : 8. AME very nearly contiguous to one another and to ALE. Middle eyes closer to ALE than to PLE in ratio of about 2 : 3. Height of clypeus equal to about one fifth the diameter of AME. Clypeus decorated with a rich coat of long white lanceolate hairs convergent toward middle line, and the usual three long upturned bristles in lower angle between AME. White clypeal hairs extend beneath ALE and dorsally between AME.

Chelicerae. Rather small, vertical, parallel, with basal segment about .50 mm. long. Fang and fang groove essentially as in male (clearly two small teeth and a minute cusp on retromargin).

Maxillae, Lip, and *Sternum.* Essentially as in male.

Legs. 4132. Tibial index of first leg 22, of fourth leg 14. Other features essentially as in male.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.96	.60	.58	.52	.26	2.92
2.	.83	.51	.52	.45	.29	2.60
3.	.89	.48	.45	.62	.32	2.76
4.	1.03	.56	.77	.83	.35	3.54

Spines. First leg: femur only two very small ones on distal end, dorsal 1, prolateral 1, also a prolateral row of six or seven small stiff bristles; patella 0; tibia only ventral 0–0–2 (last not terminal); metatarsus only ventral 0–2–2. Second leg: femur and patella as in first except prolateral row of special bristles are lacking; tibia 0; metatarsus as in first. Third leg: femur and patella as in second; tibia only retrolateral 0–1–0; metatarsus prolateral 0–2, retrolateral 0–1, ventral 0–1. Fourth leg: femur only dorsal distal 1; patella and tibia 0; metatarsus as in third. Palpal spines 0.

Abdomen. Essentially as in male.

Epigynum. Posterior margin without a notch; a small median opening a short distance anterior to margin; with a series of tubules within on each side of this opening (Fig. 72).

Color in alcohol. Carapace: essentially like the male except that the broad brown dorsolateral and lateral stripes in the male are modified in the female so that the brown stripes are restricted to dorsolateral regions and the lateral regions are entirely yellowish white thus making five conspicuous stripes on the carapace. Legs, sternum, and mouth parts unicolorous yellowish white. Abdomen: also much like that of male; here the four pairs of dorsal brown spots are conspicuous with first pair long, second pair small and oblique, third pair also oblique and connected dorsally by a narrow isthmus, the fourth pair rounded and connected dorsally by a broad isthmus; laterally and ventrally yellowish white with many white guanin granules.

Type locality. Male holotype and one male paratype from El Valle, R. P., July, 1936. Female allotype and one immature female paratype taken with males.

Carabella gen. nov.

Carapace fairly low, broad, flat dorsally; widest near middle; lateral sides gently rounded; with short median longitudinal thoracic groove only a short distance in front of steep posterior declivity. *Eyes:* anterior row moderately recurved; PME considerably closer to ALE than to PLE; PLE occupy about seven ninths of width of carapace; anterior

row slightly wider than posterior row or the two rows equally wide; quadrangle of laterals considerably wider than long; total eye space occupies a little less than half the length of carapace. *Clypeus* low. *Chelicerae* small, parallel, vertical; retromargin of fang groove with two or three small teeth. *Sternum:* considerably raised (thickened) and concave throughout raised portion; only moderately narrowed between first coxae; widest between second coxae. *Legs:* 4123. first pair somewhat enlarged; leg spines definitely reduced in number and size. *Abdomen:* elongate coniform; spinnerets of moderate size. Male palps similar to those of Cotinusa. *Genotype: Carabella banksi* sp. nov.

Carabella banksi spec. nov.

Figures 73–77

Mr. Banks ('29) described a very interesting new species as *Paramarpissa insignis.* After a careful study of the types I have been compelled to consider that his specimens, of which only females were available, and the males which I have placed in this species belong to a new genus which I have called Carabella. I thought for a time that these males could be safely matched with Mr. Banks' females, but I now consider that doubtful. Hence I have decided to treat them as two distinct species rather than to run the danger of combining them in error.

Male holotype. Total length 3.64 mm. Carapace 1.57 mm. long, 1.06 mm. wide a short distance behind PLE which occupy thirty-nine forty-eighths of width of carapace at their level, .58 mm. tall and, therefore, about .55 as tall as wide, with a moderate supply of simple hair, bristles, and white lanceolate hair to be recorded later with color; with a short median longitudinal thoracic groove beginning about two fifths of distance from PLE to posterior border; seen in profile, rises very little from AME to PLE, then descends a little to steep posterior declivity which begins about three fifths of the distance from PLE to posterior border (Fig. 73–74); nearly flat dorsally, widest considerably behind PLE but only slightly wider than opposite PME.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one twelfth of the diameter of AME. Posterior row slightly wider than anterior row, wider than middle row in ratio of 39 : 36. Quadrangle of laterals wider than long in ratio of 39 : 25. Total eye space occupies sixteen thirty-fifths of length of carapace. Ratio of eyes AME : ALE : PME :

PLE = 15 : 5.5 : 2 : 5.5. AME contiguous, separated from ALE by one fifteenth of their diameter. Middle eyes closer to ALE than to PLE in ratio of 3 : 5. Height of clypeus equal to one tenth the diameter of AME. Clypeus decorated only with bristles as follows: a few convergent toward middle line, one long one beneath each AME and incurved toward middle line, and three long upturned ones in lower angle between AME.

Chelicerae. Small, parallel, vertical, with strongly chitinized and sharply ridged outer borders and inner borders also through basal three fifths, somewhat flattened in front and with finely rugulose front surface which is somewhat iridescent. Fang short, robust at base, evenly curved. Fang groove difficult to see clearly but probably with two small teeth on each margin. On at least one paratype there are three retromarginal teeth, all small.

Maxillae. Parallel, longer than wide in ratio of about 2 : 1, moderately notched in middle of outer border, distal border nearly straight and with contiguous outer border makes nearly a right angle, somewhat excavated contiguous to lip, outer angle smoothly rounded without tubercle or hook.

Lip. About as long as wide, basal excavations reach about one third the length of the organ, reaches well beyond middle of maxillae. Sternal suture mildly procurved.

Sternum. Of unusual form; considerably raised (thickened) and distinctly concave in raised part. Generally elongate scutiform, longer than wide in ratio of 16 : 11, widest between second coxae, only a little narrower between first coxae which are considerably wider apart than base of lip, anterior border slightly narrower than base of lip, posterior end bluntly pointed and not extended between fourth coxae which are separated by one fourth their diameter. Fourth coxae considerably the stoutest but not much longer than others.

Legs. 4123. Tibial index of first leg 23, of fourth leg 13. First leg much thickened in femur, patella, and tibia (Fig. 75). No definite fringes, but all legs with a moderate amount of black simple hair.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.77	.51	.45	.35	.26	2.34
2.	.64	.39	.40	.32	.26	2.01
3.	.62	.37	.32	.41	.24	1.96
4.	.70	.38	.60	.56	.30	2.54
Palp	.44	.15	.10	—	.38	1.07

Spines. First leg: femur dorsal 0–0–1–1–0, prolateral only distal 1; patella 0; tibia only ventral 0–0–2 (reduced to cusps and not terminal); a paratype shows 0–2–2– (also cusps) on tibia; metatarsus only ventral 0–2–2. Second leg: femur and patella as in first except femur prolateral distal 2; tibia only ventral 0–0–1 (terminal and near middle); metatarsus as in first. Third leg: femur only with four near distal end (two on prolateral side, one dorsal, and one retrolateral); patella prolateral and retrolateral 0–1–0; tibia only retrolateral 1–1–0 and ventral 0–0–1 (near middle); metatarsus prolateral 1–1, ventral 0–2, retrolateral 0–1. Fourth leg: femur as in third except prolateral distal 1; patella 0; tibia prolateral 0–1–1–0, retrolateral 1–1–0, ventral 0–0–1 (near middle); metatarsus prolateral 0–1, ventral 0–2, retrolateral 0–1. Palpal spines: apparently only femur dorsal 0–0–1.

Palp. Femur practically straight, with a dorsal row of white hairs; patella and tibia short with latter about two thirds as long as the former; tibial retrolateral apophysis divided near base into two elongated spines, the dorsal one less chitinized than the ventral one; bulb considerably swollen, overlaps tibia considerably; embolus long and slender, arises near base of bulb on prolateral side and extends distally nearly to apex of cymbium (Figs. 76–77).

Abdomen. Elongated coniform, not flattened dorsoventrally, longer than wide in ratio of about 3 : 1, nearly parallel sides for three fifths of its length, anal tubercle a prominent cone with stiff black hairs; posterior spinnerets slender, three jointed, terminal joint short globose, anterior spinnerets much more robust, about two thirds as long as posterior pair, middle spinnerets hidden but definitely the slenderest and shortest; position of colulus not indicated; tracheal spiracle near base of spinnerets but concealed.

Color in alcohol. Carapace generally light brown; eyes on black spots; interocular area contains much subchitinous white guanin placed so that two large clear spots (often looking dark colored) show between intervals separating PME and PLE; a broken narrow white stripe extends from ALE to posterolateral corner on each side; four very narrow and somewhat incomplete white stripes extend over the steep posterior declivity, the first two being at the corners; all white marks made by lanceolate hairs. Legs generally light brownish; all femora brown, lighter below; first three pairs of tibiae brown prolaterally; first and second metatarsi also brown prolaterally; all tarsi yellowish white. Palps: femora brownish, other segments more distal are yellowish white. Chelicerae, maxillae, and lip light reddish brown. Sternum light amber. Abdomen: dorsal area strongly chitinized, light reddish

brown with a pair of small dark spots near middle; two dorsolateral white stripes pass back for about one fourth the length of abdomen; behind these are two dorsolateral white spots on each side, the first small and rounded, the second a short band which reaches dorsally just in front of a narrow dark band which lies across the dorsal area at about the beginning of the last fifth of the length of this part of body; at base of anal tubercle is another white narrow incomplete band; lateral sides brown with narrow yellowish stripes; venter unicolorous brownish.

Type locality. Male holotype from Canal Zone Biological Area, June, 1939. Nine male paratypes from the same locality: June–July, 1934; June, 1936; July–Aug., 1939.

Carabella insignis (Banks), 1929

Paramarpissa insignis Banks, 1929.

Mr. Banks had three females from the Canal Zone Biological Area, June–July, 1924. One of these is considerably larger than the other two, and does not seem to belong to the same species as the two smaller ones. The two smaller specimens are considered to be those to which this specific name should apply. The anterior row of eyes is recurved so that a line tangent to dorsal borders of ALE cuts off about one tenth of the diameter of AME; anterior eyes very large with ratio of eyes AME : ALE : PME : PLE = 18 : 6 : 2 : 6; clypeus almost obliterated by large AME; total eye space a little less than half the length of carapace; anterior row of eyes slightly wider than posterior row; PME closer to ALE than to PLE in ratio of about 7 : 11. Carapace widest slightly behind PLE but nearly parallel sided from opposite PME to widest place. Fang groove probably with four promarginal teeth and certainly with three retromarginal teeth. First tibiae with two ventral retromarginal spines and a single promarginal spine; first metatarsi with two pairs of ventral spines; few spines on legs elsewhere. Sternum concave with distinctly raised border. The types should be carefully studied.

Genus Cotinusa Simon, 1900

Cotinusa bryantae spec. nov.

Figures 78–85

Male holotype. Total length 5.50 mm. Carapace 2.27 mm. long, 1.66 mm. wide a short distance behind PLE which occupy thirty-four thirty-sevenths of width of carapace at their level, 1.15 mm. tall and,

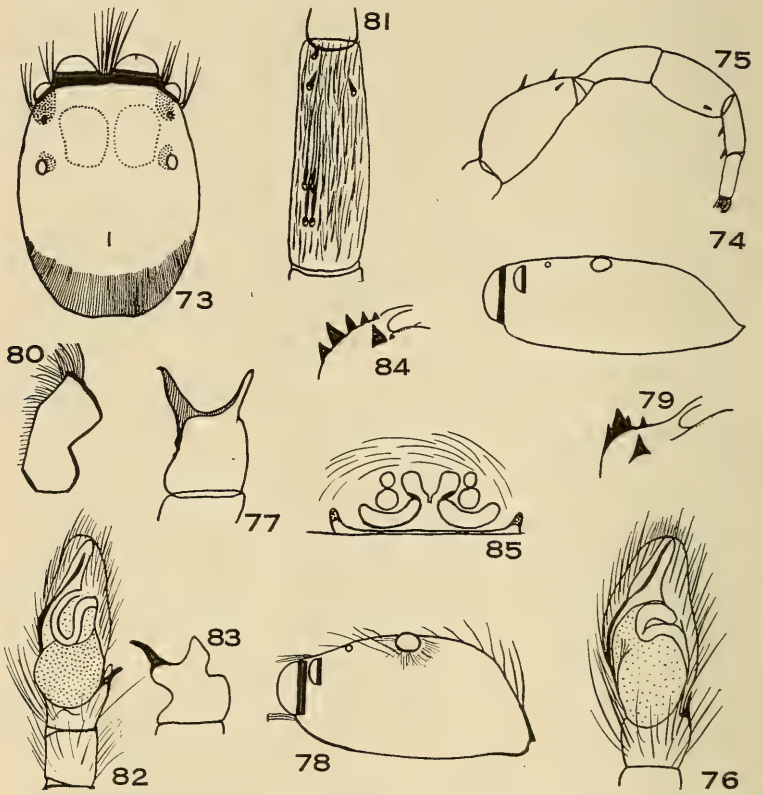
therefore, about eleven sixteenths as tall as wide, rises only slightly from AME to highest point opposite PLE, then falls very gently for about six elevenths of distance to posterior border, from which place posterior declivity descends steeply (Fig. 78); somewhat excavated around PLE except medially; flat in interocular region; large deposits of white guanin beneath chitin of interocular area; a short median longitudinal thoracic groove beginning some distance behind posterior borders of PLE.

Eyes. Anterior row recurved so that a straight line from dorsal borders of ALE cuts off about one tenth of diameter of AME. Anterior row and posterior row equal in width. Middle row shorter than other rows in ratio of about 15 : 17. Quadrangle of laterals wider than long in ratio of 17 : 10. Total eye space occupies thirty-five sixty-eighths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 23 : 10 : 2.5 : 10. AME separated from one another by one twentieth of the diameter of AME, from ALE by twice as far. Middle row closer to ALE than to PLE in ratio of 3 : 5. Height of clypeus nearly equal to one third of diameter of AME. Clypeus provided with hair and bristles as follows: in lower angle between AME are two stiff upturned bristles arising together; a group of about sixteen long bristles converging toward the middle line and arranged irregularly; a scant fringe of white hairs along ventral margin. AME surrounded by rust-red hairs.

Chelicerae. Vertical, very slightly divergent with outer margins ridged and strongly chitinized, considerably produced, basal segment .67 mm. long, so oriented as to make a trough with medial edges forming the bottom, only a few short hairs on prolateral surface. Fang moderately slender, evenly curved, with a low blunt tubercle on retrolateral margin about one third of its length from the base. Fang groove very distinct, slightly excavated, with a fairly robust tooth on promargin which has a small tooth attached to it on each side and a short distance toward base of fang another small independent tooth (some irregularity in this feature has been noted among paratypes); a single retromarginal tooth of moderate size (Fig. 79).

Maxillae. Longer than wide in middle in ratio of about 35 : 13, outer margin acutely notched in the middle, quite sharply pointed distally, with well developed scopula along truncature and medial border (Fig. 80).

Lip. As wide as long, widest at distal end of basal excavations which reach about two fifths of its length, reaches about two fifths the length of maxillae, distal border broadly rounded. Sternal suture gently procurved.



External Anatomy of Spiders

Figs. 73–74. *Carabella banksi* Chickering; carapace, dorsal and lateral views.
Fig. 75. *C. banksi* Chickering; first leg, lateral view.
Figs. 76–77. *C. banksi* Chickering; male palp, ventral view and palpal tibia, retrolateral view.
Fig. 78. *Cotinusa bryantae* Chickering; carapace, lateral view.
Fig. 79. *C. bryantae* Chickering; cheliceral teeth, male.
Fig. 80. *C. bryantae* Chickering,; maxilla.
Fig. 81. *C. bryantae* Chickering; first tibia, ventral view.
Figs. 82–83. *C. bryantae* Chickering; male palp ventral view and palpal tibia, retrolateral view.
Fig. 84. *C. bryantae* Chickering; cheliceral teeth, female.
Fig. 85. *C. bryantae* Chickering; epigynum, ventral view.

Sternum. Gently convex, especially in posterior half; scutiform; longer than wide in ratio of about 4 : 3; widest between second coxae but not much narrowed between first coxae; somewhat wider at anterior border than base of lip; terminates posteriorly in a blunt point which is not extended between fourth coxae which are separated by only one eighth of their diameter.

Legs. 4132. Tibial index of first leg 20, of fourth leg 14. First coxae much the stoutest, others progressively slenderer to the fourth, none much elongated. First leg considerably enlarged especially femur, patella, and tibia. Anterior tibiae each with two pairs of bulbous hairs on ventral surface along promargin in basal half; neither pair of bulbous hairs much elongated (Fig. 81). A poorly developed black ventral fringe on anterior femora, patellae, and tibiae.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.15	.77	.78	.51	.41	3.62
2.	1.04	.65	.68	.51	.41	3.29
3.	1.02	.58	.64	.77	.40	3.41
4.	1.28	.58	.88	.96	.45	4.15
Palp	.66	.33	.17	—	.66	1.82

Spines. First leg: femur only dorsal 0–0–1–1–1 and one prolateral near distal end; patella 0; tibia only ventral 0–0–2–1p (all short, much reduced) (Fig. 81); metatarsus only ventral 2–2. Second leg: femur and patella as in first; tibia 0; metatarsus as in first. Third leg: femur only one distal dorsal, two prolateral distal, and one retrolateral distal; elsewhere 0, with ventral distal bristles on metatarsus. Fourth leg: femur only three distal, one dorsal, and one each on both prolateral and retrolateral surfaces; elsewhere 0. Palpal spines: only one dorsal distal.

Palp. Femur only slightly curved as a whole but it is excavated ventrally and has a low ventral tubercle near distal end (suggestive of the femora of Chapoda festiva), with a few white hairs on retrolateral surface and dark hairs at distal end of dorsal surface; patella and tibia short but the former is nearly twice as long as the latter; tibial retrolateral apophysis broad at base, terminates in two processes, the dorsal of which is blunt and not well chitinized while the ventral one is slender, curved, and strongly chitinized (Figs. 82–83); tarsus as long as femur, with a much swollen bulb and an embolus which arises near base of cymbium and extends forward almost to its tip.

Abdomen. Slender, nearly cyclindrical, longer than wide in ratio of about 3 : 1, with four dorsal sigilla in second quarter; anal tubercle a

slender cone surrounded with weak bristles. Anterior spinnerets much the most robust, of moderate length; posterior pair nearly fifty percent longer and rather slender; middle pair about as long as anterior pair but very slender, nearly enclosed by others. Position of colulus not indicated except, perhaps, by a small black spot. Tracheal spiracle near base of spinnerets.

Color in alcohol. First pair of legs: femora dark reddish brown, nearly black prolaterally and retrolaterally, patellae and tibiae a deep rich amber except yellowish distal ends of tibiae, metatarsi and tarsi yellowish white. Second leg: much the same except tibiae more than half yellowish white. Third and fourth legs unicolorous yellowish white. Palps and chelicerae generally deep amber; maxillae and lip the same with yellowish tips. Sternum brown. Carapace: generally reddish brown, very dark along ventral margin, streaked with darker color laterally. All eyes except AME on black spots; interocular area spotted with yellowish white from large subchitinous masses of white guanin; around all eyes except AME are dull golden hairs; around AME are rust red hairs; elsewhere is a moderate amount of whitish procumbent hair. Abdomen: yellowish with many brownish dots and streaks on dorsal side with no special pattern; laterally many alternate brown and yellowish narrow stripes; venter with a broad central dark stripe which widens in three places, just behind genital furrow, in the middle, and just anterior to spinnerets.

Female allotype. Total length 6.78 mm. Carapace 2.50 mm. long, 1.73 mm. wide just a short distance behind PLE which occupy a little more of width of carapace than in male, 1.09 mm. tall and, therefore a little lower than in male. Median longitudinal thoracic groove less distinctly indicated than in male. Otherwise essentially as in that sex.

Eyes. Anterior row recurved so that a straight line from dorsal borders of ALE cuts off about one seventh of diameter of AME. Posterior row longer than anterior row in ratio of 71 : 66. Middle row shorter than anterior row in ratio of 61 : 66. Quadrangle of laterals wider than long in ratio of 71 : 38. Total eye space occupies thirty-three seventy-thirds of length of carapace (whereas in male it occupies slightly more than half). Clypeus much narrower than in male, height equal to only about one tenth of diameter of AME. Clypeus with a fairly copious supply of long white hair converging toward middle line. Otherwise as in male.

Chelicerae. Vertical, parallel, not produced, basal segment .62 mm. long. Fang moderately slender, evenly curved. Fang groove with a row of five promarginal teeth; the first is of moderate size, second is

largest, others decrease in size to last which is minute and sometimes lacking in paratypes; retromargin with a single large tooth and a very minute cusp near the base of the larger one (Fig. 84).

Maxillae and *Lip.* Essentially as in male except that maxillae are relatively shorter and less deeply notched in middle of outer margin.

Sternum. Rather different in shape than in male; longer than wide in ratio of about 7 : 9, widest at interval between second and third coxae, considerably narrowed between first coxae which extend over that part of sternum so that they are separated by less than half the distance between second coxae. Otherwise essentially as in male.

Legs. 4312. Tibial index of first leg 23, of fourth leg 11.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.09	.76	.70	.43	.45	3.43
2.	1.13	.68	.64	.45	.51	3.41
3.	1.21	.64	.64	.77	.43	3.69
4.	1.45	.70	1.09	1.13	.45	4.82

No fringes on legs. Two pairs of ventral bulbous hairs on anterior tibiae very long, both reach nearly or quite to metatarsus.

Spines. First leg: femur only one dorsal distal and one prolateral distal (both small; on left side there are two prolateral distals, not found on most paratypes); patella 0; tibia only ventral 0–0–2–1p as in male; metatarsus only ventral 2–2 (hardly more than cusps). Second leg: femur and patella as in first; tibia 0; metatarsus as in first. Third leg: femur as in first on right; elsewhere 0. Fourth leg: femur only one dorsal distal; elsewhere 0. Palpal spines 0.

Abdomen. Much more robust than in male. Generally cylindriform, longer than wide in ratio of 66 : 29. Otherwise as in male.

Epigynum. Rather small and inconspicuous; with a nearly straight posterior margin contiguous to genital groove; at each end of posterior margin is a notch; a central low septum separates two shallow cavities; within, there is a curved tubule on each side just in front of posterior margin and in front of these are two small spermathecae on each side (Fig. 85). Dissection reveals that what is seen externally is in reality a coiled tubule on each side seen from different angles.

Color in alcohol. Quite different from that of male. All legs, palps, chelicerae, maxillae, lip, and sternum yellowish white of different shades. Carapace: all eyes except AME on black spots; interocular area light reddish brown with white subchitinous guanin masses showing through; just anterior to thoracic groove is a dark dotted recurved

band, in front of which is a yellowish spot and behind it is a broad yellowish white spot which continues as a narrowed stripe to posterior border; from ALE to posterior border on each side is a broad light reddish brown stripe which covers about half of lateral side; remainder of lateral side to ventral border is entirely yellowish white, thus making a striking color pattern on carapace. Abdomen: dorsally color is mixture of brownish spots and dots, irregular small white spots from the deposits of white guanin against a yellowish background; the brownish spots are roughly arranged through center in the form of a deeply indented stripe; laterally are short narrow broken stripes of alternating brown and yellowish white with many of the white guanin spots; ventral pattern essentially as in male. One female paratype shows a series of six rather poorly defined transverse dorsal abdominal light reddish bars on dorsum. This condition may be the normal one in life because of the loss of colored hairs in handling.

Type locality. Male holotype and female allotype taken together, Canal Zone Biological Area, July, 1936. Several male and female paratypes from Canal Zone Biological Area: June-July, 1934; June-July, 1936; Aug., 1939; Ft. Randolph, C. Z., Aug., 1936; Ft. Sherman, C. Z., Aug., 1939.

Cotinusa simoni spec. nov.

Figures 86–88

Male holotype. Total length 4.86 mm. Carapace 1.92 mm. long, 1.34 mm. wide (relatively somewhat shorter than in *C. bryantae* sp. nov.), PLE occupy fifty-six fifty-ninths of width of carapace at their level, .84 mm. tall; with short median longitudinal thoracic groove essentially as in *C. bryantae* sp. nov.; interocular area filled with large irregular deposits of white subchitinous masses of guanin.

Eyes. Anterior row recurved so that a straight line from dorsal border of ALE cuts off one twentieth of diameter of AME. Posterior row slightly wider than anterior row. Middle row narrower than anterior row in ratio of 49 : 55. Quadrangle of laterals wider than long in ratio of about 11 : 7. Total eye space occupies nine seventeenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 20 : 8 : 2 : 8. AME separated from one another by only one fortieth of their diameter, from ALE by four times as far. Middle eyes closer to ALE than to PLE in ratio of 8 : 13. Height of clypeus equal to three twentieths of diameter of AME. Clypeus fringed ventrally by

a few white hairs; three long upturned bristles in lower angle between AME. Light rust red hairs around AME.

Chelicerae. Vertical, parallel, not produced, somewhat swollen in front from proximal medial angle diagonally to distal outer corner; otherwise without noteworthy features. Fang of moderate size, evenly curved. Fang groove with four promarginal teeth, the first is small, the second of moderate size, the third and fourth hardly more than cusps; retromargin with a single fairly robust tooth which shows slight indications of a fissidentate condition. (Fig. 86.)

Maxillae. Essentially parallel, longer than wide in middle in ratio of about 2 : 1, moderately dilated distally, moderately concave along outer border, rounded at distal border, with well developed scopula at truncature and along medial edge for some distance.

Lip. Wider at base than long in ratio of 11 : 10, basal excavations reach only about one third of its length, reaches to middle of maxillae. Sternal suture gently procurved.

Sternum. Quite convex except in anterior quarter where it is nearly flat; longer than wide in ratio of 3 : 2, widest between second coxae, gradually narrowed to about width of lip at anterior end; terminates bluntly at posterior end which is not extended between fourth coxae which are separated by only two elevenths of their diameter.

Legs. 4132. Tibial index of first leg 17, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.07	.63	.65	.40	.42	3.17
2.	.82	.57	.58	.40	.37	2.74
3.	.90	.45	.51	.64	.39	2.89
4.	1.03	.52	.71	.75	.38	3.39
Palp	.53	.27	.15	—	.46	1.41

First leg only moderately enlarged. Two pairs of hairs bulbous at base on ventral side of each anterior tibia along promargin and on basal half; neither pair especially elongated. Remnants of a black ventral fringe on first tibiae and metatarsi.

Spines. First leg: femur dorsal 0–0–0–1–0 and two prolateral distals; patella 0; tibia only ventral 0–0—2 (retromarginal one is a very minute cusp)—2; metatarsus only ventral 2–2 (small). Second leg: femur and patella as in first; tibia 0; metatarsus as in first. Third leg: femur only prolateral distal two; patella and tibia 0; metatarsus only ventral distal 1, and retrolateral distal two stiff bristles. Fourth leg:

femur only prolateral distal 1; patella and tibia 0; metatarsus only retrolateral distal 1.

Palp. Femur only slightly curved, with only a weak remnant of the prominent ventral tubercle found in *C. bryantae* sp. nov.; patella and tibia both short but former longer than latter in ratio of 9 : 5; tibial retrolateral apophysis a single simple spur; bulb only moderately swollen, embolus originates on prolateral side near middle of bulb and then runs forward in a somewhat sinuous fashion to near tip of cymbium (Figs. 87–88).

Abdomen. Slender, less cylindriform than in *C. bryantae* sp. nov., considerably tapered posteriorly, longer than wide in ratio of about 3 : 1, widest about one third from base which is only a little narrower than widest part; anal tubercle a broad flattened cone; anterior pair of spinnerets most robust, of moderate length; posterior pair sixty percent longer than anterior pair and much slenderer; middle pair slenderest, nearly as long as anterior pair, enclosed by others. Position of colulus not indicated. Tracheal spiracle presumed to be a short distance from base of spinnerets in a fold.

Color in alcohol. Palps and chelicerae reddish brown; lip and maxillae the same with yellowish white tips. First leg: reddish brown except the yellowish white metatarsi and tarsi; femora nearly black on prolateral and retrolateral sides with a good deal of iridescence which continues over the same surfaces of patellae and tibiae. Second legs much like first except lighter colored. Third and fourth legs unicolorous yellowish white. Carapace: generally a rich reddish brown with all eyes on black spots except AME; ventral margin narrowly black; light yellowish hairs lie around eyes except AME where the hairs are reddish; interocular area spotted with white because of masses of white guanin beneath chitin. Abdomen: a black spot at base; a narrow yellowish central stripe over cardiac area extending only about one fifth the length of this part of body; on each side of the short yellowish stripe is a poorly defined dark brownish gray stripe which unites with its mate to form a central, poorly defined stripe extending to the posterior end; lateral sides yellowish, venter with a broad nearly black central stripe which begins at base and extends to posterior end, narrowing a little in the last third.

Type locality. Male holotype and one male paratype from El Valle, R. P., July, 1936.

Key to the males of Cotinusa from Panama

1. Palpal tibia with two distinct retrolateral processes . . . *C. bryantae*, (p. 90)
1. Palpal tibia with only one distinct retrolateral process. . *C. simoni*, (p. 96)

Genus Psecas C. Koch, 1850

Psecas enoplus Chamberlin and Ivie, 1936

Figures 89–95

Deza sumptuosa Banks, 1929

Mr. Banks ('29) had a female from the Canal Zone Biological Area, June, 1924 which he identified as *Deza sumptuosa* (Perty). Chamberlin and Ivie ('36) described the female from my collection of 1928 as a new species. The Peckhams had the male and female of Perty's species from Brazil and Trinidad. The male is not now in the collection in the Museum of Comparative Zoölogy, but I have compared the female with my specimens of this species. On the basis of this comparison together with the descriptions of previous workers I conclude that the Panamanian species is a good species. The color pattern is strikingly alike in the two species, but there are several other differences in structural features as well as in the details of both male palpus and epigynum. The specific name in the original description of the female is spelled in three different ways. I have adopted the first spelling and the form in which it is written in the index to the paper containing the description.

Male allotype. Total length 7.17 mm. Carapace 3.26 mm. long, 1.95 mm. wide a little behind PLE which occupy five sixths of width of carapace at their level, 1.15 mm. tall, and therefore, a little less than six tenths as tall as wide; very flat in interocular region, with a shallow transverse groove just behind PLE which continues laterally as a somewhat depressed region below these eyes; behind shallow depression thoracic part is little if at all lower than cephalic part; steep posterior declivity begins about halfway from PLE to posterior border (Fig. 89); a short median longitudinal thoracic groove extends from the transverse dorsal groove, usually covered by scales.

Eyes. Viewed from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one twenty-fifth of the diameter of AME. Anterior row wider than posterior row in ratio of 40 : 37. Anterior row wider than middle row in ratio of 8 : 7. Quadrangle of laterals wider than long in ratio of 4 : 3. Total eye space occupies just a little more than half the length of carapace. Ratio of eyes AME : ALE : PME : PLE = 28 : 14.5 : 2.5 : 13.5. AME contiguous with one another and almost so with ALE. Middle eyes closer to ALE than to PLE in ratio of 5 : 6. Height of clypeus equal to only one twentieth of the diameter of AME. First row pro-

jects, especially AME, far over clypeus. Clypeus decorated only with dark colored short bristles along ventral margin and longer ones above, three long upturned bristles in lower angle between AME.

Chelicerae. Somewhat porrect, somewhat divergent, robust, basal segment .90 mm. long, outer border somewhat sinuous. Fang somewhat sinuous, fairly long, becomes suddenly more slender in middle. Fang groove with two small promarginal teeth near medial end; four small teeth in a row close together on the retromargin and also close to a remarkable large tooth bearing three cusps, all are in close relationship to a chitinous ridge (Fig. 90). Cusps of large tooth vary considerably among the paratypes in respect to placement and relative size.

Maxillae. Longer than wide in middle in ratio of about 3 : 1; acutely notched in outer border near insertion of palp which is in basal third; outer distal corner smoothly rounded; scopula well developed along truncature; somewhat excavated contiguous to lip; moderately dilated but not greatly widened at tip.

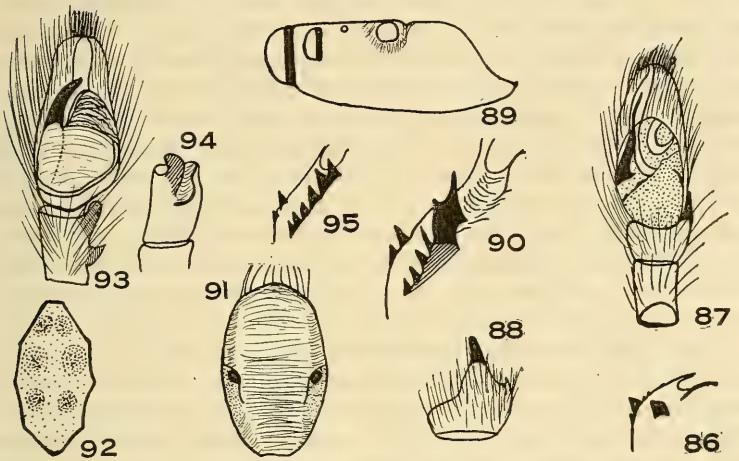
Lip. Longer than wide in ratio of 15 : 19, elongate oval in outline; a broad central rugulose ridge extends from base to tip and on each side of ridge is a shallow groove divided in the middle by a short oblique sharp ridge (Fig. 91); partly hidden by enlarged first coxae. Sternal suture very short and straight.

Sternum. Longer than wide in ratio of 65 : 32, quite convex with six secondary convexities opposite first, second, and third coxae, those opposite the second being much the most prominent; very narrow at anterior end where it is largely hidden by enlarged first coxae; posterior end a blunt point not extended between fourth coxae which are separated by only one tenth of their width (Fig. 92). A narrow, strongly chitinized margin throughout.

Legs. 1423. Tibial index of first leg 12, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.24	1.54	2.17	1.47	.62	8.04
2.	1.50	.96	1.15	.96	.50	5.07
3.	1.51	.70	.84	.90	.50	4.45
4.	1.92	.90	1.66	1.21	.46	6.15
Palp	1.00	.36	.34	—	.78	2.47

All legs hairy, first especially so, but with no definite fringes.



External Anatomy of Spiders

Fig. 86. *Cotinusa simoni* Chickering; male cheliceral teeth.
Figs. 87–88. *C. simoni* Chickering; male palp, ventral view, and palpal tibia, retrolateral view.
Fig. 89. *Psecas enoplus*, carapace, lateral view.
Fig. 90. *P. enoplus*, male cheliceral teeth.
Figs. 91–92. *P. enoplus*, maxilla and sternum.
Figs. 93–94. *P. enoplus*, male palp, ventral view, and palpal tibia, retrolateral view.
Fig. 95. *P. enoplus*, female cheliceral teeth.

Spines. First leg: femur only dorsal 0–0–1–1–1–0, prolateral distal 2 on right, 1 on left; patella only prolateral 0–1–0; tibia only prolateral 0–1–0–0 (perhaps irregular, found only on right side of allotype male and sometimes not at all in paratypes), ventral 2–2–2–2 (second and third on retromargin very long); metatarsus only ventral 2–2. Tibial and metatarsal ventrals from raised bases. Second leg: femur only dorsal as in first, and prolateral only one distal; patella 0; tibia only prolateral 0–0–1 and ventral 2–2–2 (promarginal short, retromarginal long; metatarsus only ventral 2–2). Third leg: femur dorsal as in first, prolateral and retrolateral only one distal on each side; patella 0; tibia only ventral 0–0–1p; metatarsus only retrolateral 0–0–1. Fourth leg: femur only dorsal as in first, retrolateral distal 1; patella 0; tibia only ventral 0–0–2; metatarsus 0. Palpal spines: only femur dorsal 0–1–1, and a group of five short ones at tip of cymbium.

Palp. Femur somewhat curved ventrally, especially in basal half; patella and tibia nearly equal in length; tibia somewhat excavated along distal half of retrolateral side, with a sharp curved ridge and a short robust apophysis (Figs. 93–94); tarsal bulb only gently swollen, with a broad blunt heavily chitinized rugulose portion and a short robust, gently curved embolus; at tip is a group of five short stiff spines; white, strongly iridescent scales all along dorsal surface of femur, patella, tibia, and tarsus, the latter also with much long yellowish white hair.

Abdomen. Cylindriform, longer than wide in ratio of about 30 : 11, a little the widest in middle but nearly as wide at base; anal tubercle a short broad cone; spinnerets all short, anterior pair most robust, posterior longer than anterior pair by terminal segment, middle pair slenderest and hidden by others; position of colulus uncertain; tracheal spiracle near base of spinnerets and not guarded by a tubercle.

Color in alcohol. Chelicerae dark reddish brown; maxillae much the same with lighter tips. First leg generally dark reddish brown with tarsus yellowish; many white iridescent scales, especially on dorsal side of femur and dorsal and lateral sides of patella, a broad ring on tibia about a quarter from its base, and also distal half of metatarsus; also some bluish and purplish iridescence on parts not provided with white scales; other legs yellowish with fourth metatarsus gray. Carapace: dark reddish brown in general; interocular area highly irridescent; white scales in a broad stripe from PLE to ALE and then across head dorsal to AME; behind PLE is a broad transverse, somewhat procurved band of the white scales from which a short median stripe extends back nearly to posterior border; a narrow white marginal stripe

extends from a little in front of ALE to posterior border but the two stripes from opposite sides do not meet across the posterior border. Abdomen: grayish at base with many white iridescent scales; behind this is a broad bright rust-red band and further back three grayish bars with the white iridescent scales and two red bars alternating in a very striking pattern; the grayish bar is bordered on both margins by a narrow line of black hair; behind the last gray bar is a short median broad gray spot with a small red dot on each side; the venter has a broad central nearly black, stripe and is elsewhere yellowish white as also are the lateral sides.

Type locality. The male allotype is from Ft. Sherman, C. Z., Aug. 1939. Paratype males from Canal Zone Biological Area, June–July, 1934; Aug., 1936; June, 1939.

Female. Since the holotype female was briefly described and its epigynum figured by the authors of the species, I am only adding a few notes as follows: color almost identical with that of male; promargin of fang groove has two teeth of which the more medial is very small, the retromargin usually has a row of six teeth of which the last two are united into a bicuspid fissidentate tooth (Fig. 95) (paratypes may show only five or seven retromarginal teeth); the first tibia seems to lack the prolateral spine; second leg like that of male except tibia ventral spines 1r–2–2; third and fourth legs like those of male except there are no tibial and no metatarsal spines. Several females from Canal Zone Biological Area, Porto Bello and El Valle, R. P., and Ft. Sherman, C. Z.

Genus Scopocira Simon, 1900

Scopocira panamena Chamberlin and Ivie, 1936

Figures 96–97

Female allotype. Total length 3.52 mm. Carapace 1.47 mm. long, .96 mm. wide at level of PLE which occupy the full width of carapace at their level, .72 mm. tall and, therefore, .75 as tall as wide; ascent from AME to PLE very gradual; descent from PLE at first very gradual to steep posterior declivity which begins about one fourth of distance from PLE to posterior border; unlike those of male, the lateral sides nearly vertical; if any median thoracic groove is present it is extremely small and just at beginning of steep declivity.

Eyes. Seen from in front, anterior row recurved so that a line

tangent to dorsal borders of ALE cuts off about one eighth of the diameter of AME. Anterior row slightly wider than posterior row, wider than middle row in ratio of 47 : 40. Quadrangle of laterals wider than long in ratio of 47 : 33. Total eye space occupies forty sixty-sevenths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 16.5 : 7 : 2.3: 7. AME nearly contiguous to one another and to ALE. Middle eyes closer to ALE than to PLE in ratio of about 4 : 5. Height of clypeus equal to five sixteenths of the diameter of AME. Clypeus decorated with a brush of white hairs which extends beneath ALE, a few long white bristles, and three long yellowish upturned bristles in lower angle between AME.

Chelicerae. Simple, vertical, parallel, with no indication of the modifications so pronounced in male. Fang simple, slender, evenly curved. Fan groove distinct; with four small promarginal teeth, all well spaced; retromargin with four teeth crowded close together (Fig. 96).

Maxillae. Parallel, longer than wide in middle in ratio of about 3 : 2, very slightly notched in middle of outer border; somewhat dilated in distal half, outer distal corner well rounded with no tubercle, scopula well developed along truncature.

Lip. Wider than long in ratio of 10 : 7, basal excavations reach about one third of length of organ, reaches about one third the length of maxillae. Sternal suture procurved.

Sternum. Scutiform, only slightly convex, longer than wide in ratio of 7 : 5, widest between second coxae, anterior border somewhat wider than base of lip, anterior coxae wide apart, posterior end bluntly rounded and not extended between fourth coxae which are separated by three elevenths of their diameter. First and fourth coxae somewhat stouter than others.

Legs. 4132. Tibial index of first leg 13, of fourth leg 12.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.96	.45	.83	.51	.36	3.11
2.	.70	.34	.45	.41	.32	2.22
3.	.77	.35	.51	.50	.32	2.45
4.	1.08	.38	.83	.74	.38	3.41

All legs slender; with a small amount of hair and no special tufts or fringes.

Spines. First leg: femur apparently only dorsal distal 1; patella 0; tibia only ventral 2–2–2–2 (not terminal); metatarsus only ventral 0–2–2 (first pair half as long as segment). Second leg: same as first except tibia ventral only 2–2–2 (last not terminal) and neither tibial nor metatarsal spines as robust and long as in first. Third leg: apparently only femur dorsal distal 1 and metatarsus prolateral 0–1. Fourth leg: as in third. Palpal spines: apparently only tarsal prolateral 1 near base, and retrolateral 2 near base.

Abdomen. Ovoid, longer than wide in ratio of about 5 : 3, widest about three fifths from base, anal tubercle an inconspicuous cone; six spinnerets short, closely crowded, inconspicuous; position of colulus indicated by a transverse band of black hairs; tracheal spiracle near base of spinnerets with a distinct lip but no tubercle.

Epigynum. Posterior margin with a V-shaped notch; anterior to the notch is a complicated series of curved lines and inner tubules (Fig. 97).

Color in alcohol. Adult males have little color pattern, but immature males often resemble the females quite closely. Carapace: generally reddish brown, with each PLE on a separate black spot, and PME and PLE on a common black spot; interocular area yellowish; a cloudy band between PLE; behind this a narrow lighter band; lateral sides streaked with black. Legs: first pair yellowish white with lateral brown or black stripes on all segments except coxae and tarsi; second and third pair unicolorous yellowish white; fourth pair like first except prolateral stripe on femora lacking. Palps yellowish white. Chelicerae brownish in front, yellowish white elsewhere. Maxillae brownish along outer margin, elsewhere yellowish white. Lip and sternum brownish. Abdomen: dark brown or black with a narrow broken central yellowish white stripe extending through basal two fifths, a pair of dorsolateral yellowish white stripes curved dorsally, then two pairs of yellowish white dorsolateral bars and finally a circular yellowish white spot just anterior to anal tubercle incompletely divided by a row of three small dots; venter yellowish white with a broad central incomplete dark brown stripe from genital groove to spinnerets, the last pair of dorsolateral white bars extends to the venter.

Type locality. Female allotype from Canal Zone Biological Area, Aug., 1939. Female paratypes and many males from the same locality; June–July, 1934; June–Aug., 1936; June–Aug., 1939; Balboa, C. Z., Aug., 1936; Porto Bello, R. P., Aug., 1936; Canal Zone Forest Reserve, C. Z., July–Aug., 1939; Madden Dam and Ft. Sherman, C. Z., Aug., 1939.

Genus Thiodina Simon, 1900

Thiodina sylvana (Hentz), 1845

Attus sylvanus Hentz, 1845
A. retiarius Hentz, 1845
Plexippus retiarius Peckham, 1885
Dendryphantes retiarius Banks, 1898
Colonus puerperus F. Cambridge, 1901
Thiodina puerpera Simon, 1901
T. sylvana Peckham, 1909
T. sylvana Petrunkevitch, 1911
T. sylvana Petrunkevitch, 1925
T. puerpera Banks, 1929
T. sylvana Banks, 1929
T. pseustes Chamberlin and Ivie, 1936

This species has been known under many names of which I give only those most important for this study. I have a very large number of specimens collected from nearly every locality I have visited in Panama. I believe they all belong to one species which is very variable in regard to color, size, and, to a lesser extent, other features as well. This fact has led even modern workers to consider that two or more species are mixed in the collections. Those who consider the teeth along the retromargin of the fang groove as being so important will do well to note that in this species the number of teeth may vary from only one to at least five with three being the most common number. Canal Zone Biological Area, June–July, 1934; June–July, 1936; June–Sept., 1939; January–February, 1940 (Zetek); El Valle, R. P., July, 1936; Arraijan, R. P., Aug., 1936; Porto Bello, R. P., Aug., 1936; Frijoles, C. Z., Aug., 1936; C. Z. Forest Reserve, C. Z., July–Aug., 1939; Ft. Sherman, C. Z., Aug., 1939; France Field, C. Z., Aug., 1939; Madden Dam, C. Z., Aug., 1939; Boquete, R. P., July, 1939; El Cermano, R. P., July, 1941 (Zetek).

Toloella gen. nov.

Carapace moderately high and moderately broad; lateral sides gently rounded, gently arched dorsally from AME to steep posterior declivity; with a short median longitudinal thoracic groove about halfway from PLE to steep posterior declivity. *Eyes:* anterior row moderately recurved; PME slightly closer to PLE than to ALE; PLE occupies nearly entire width of carapace; anterior row slightly wider than posterior

row; quadrangle of laterals considerably wider than long; total eye space occupies a little more than half the length of the carapace. *Clypeus* moderately low. *Chelicerae* vertical, parallel, of moderate size; retromargin of fang groove with three small teeth. *Maxillae* parallel, without special modifications. *Sternum:* quite convex, widest between second coxae, but not much narrowed between first coxae. *Legs:* 4132; first pair not enlarged, without fringes. *Abdomen* ovoid; spinnerets of moderate size. *Genotype: Toloella eximia* sp. nov.

Toloella eximia spec. nov.

Figures 98–103

Male holotype. Total length 2.56 mm. Carapace 1.36 mm. long, .99 mm. wide at PLE which occupy twenty-two twenty-thirds of width of carapace at their position, .70 mm. tall and, therefore, about .70 as tall as wide; ascent is gradual and moderate from AME to PLE, then descent is very slight to the steep posterior declivity which begins a little more than halfway from PLE to posterior border; lateral sides nearly vertical from ALE to PLE and very little wider at level of PLE than at level of ALE (Figs. 98–99); with a short but distinct median longitudinal thoracic groove a short distance behind PLE.

Eyes. Anterior row recurved so that dorsal borders of ALE and AME are on a level with one another. Anterior row slightly wider than posterior row, wider than middle row in ratio of 46 : 41. Quadrangle of laterals wider than long in ratio of 46 : 39. Total eye space occupies seven twelfths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 16 : 9 : 2 : 8.5. AME subcontiguous with one another and with ALE. Middle eyes closer to PLE than to ALE in ratio of 3 : 4. Height of clypeus equal to one fourth the diameter of AME. Clypeus decorated with a ventral fringe of weak brownish bristles, a single long brown convergent bristle beneath outer border of AME, a few scattered brown bristles irregularly placed, and three long upturned brownish bristles in lower angle between AME, upper one is very long, lower two much shorter, also a few whitish hairs around margins of AME.

Chelicerae. Vertical, parallel, of moderate size, basal segment .38 mm. long, without conspicuous features. Fang of moderate size, slightly sinuous. Fang groove distinct; promargin with four separate teeth, three being small, the other large and bearing two cusps; retromargin with three teeth, the most medial of which is a fissidentate tooth (Fig. 100).

Maxillae. Parallel, longer than wide in middle in ratio of about 16 : 9, only slightly concave along middle of outer border, outer distal angle almost a right angle, outer distal corner without tubercle or hook.

Lip. Wider than long in ratio of 5 : 4, basal excavations reach only slightly more than one fourth the length of the organ, reaches to about the middle of the maxillae. Sternal suture straight.

Sternum. Scutiform, quite convex, longer than wide in ratio of 26 : 21, widest between second coxae, first coxae separated by two thirds the greatest width of sternum, anterior border as wide as base of lip: posterior end a blunt point, not extended between fourth coxae which are separated by two fifths of their diameter. Anterior coxae considerably the largest.

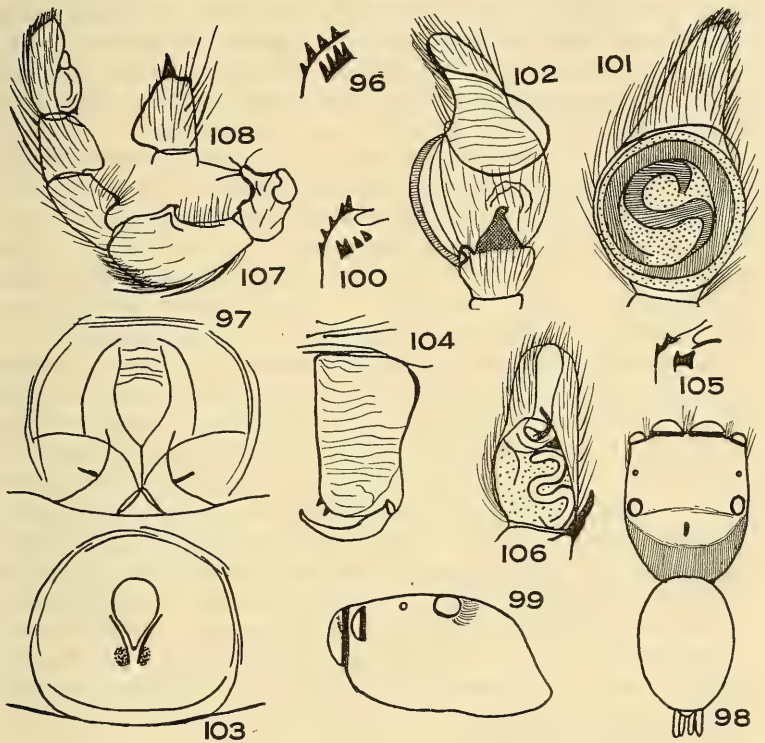
Legs. 4132. Tibial index of first leg 15, of fourth leg. 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.80	.47	.63	.46	.33	2.69
2.	.67	.40	.43	.40	.30	2.20
3.	.70	.38	.43	.47	.33	2.31
4.	.83	.37	.57	.60	.36	2.73
Palp	.47	.21	.13	—	.58	1.19

All legs with a moderate supply of simple hair but with no fringes or special tufts.

Spines. First leg: femur and patella 0; tibia only ventral 2–2–2, last pair not terminal, first pair near base, promarginal series so far lateral that they would be counted as such by some; metatarsus only ventral 0–2–2; all tibial and metatarsal spines long and fairly robust. Second leg: femur and patella 0; tibia only prolateral 0–0–1–0, ventral 1r–2–2; metatarsus only ventral 2–2. Third leg: femur dorsal 0–1–0–1 and prolateral distal 1; patella 0; tibia prolateral and retrolateral 0–0–1–0, ventral 0–1p–0–1r; metatarsus prolateral 0–2, retrolateral 0–1, ventral 0–1. Fourth leg: femur only dorsal 0–1–0–1 and retrolateral distal 1; patella 0; tibia and metatarsus as in third. Palpal spines apparently 0.

Palp. Complicated; femur straight; patella and tibia both short with latter about two thirds as long as former; tibial retrolateral apophysis a stout distal spur, very broad at base, tapered to a point which is hooked; bulb with embolus coiled two and one half times around its periphery and with its very slender filamentary distal end extended over to dorsal surface of cymbium where it describes a long loop back to tip of tarsus (Figs. 101–102).



External Anatomy of Spiders

Fig. 96. *Scopocira panamena*, female cheliceral teeth.
Fig. 97. *S. panamena*, epigynum, ventral view.
Figs. 98–99. *Toloella eximia* Chickering; entire body, dorsal view and carapace, lateral view.
Fig. 100. *T. eximia* Chickering; male cheliceral teeth.
Figs. 101–102. *T. eximia* Chickering; male palp, ventral and retrolateral view.
Fig. 103. *T. eximia* Chickering; epigynum, ventral view.
Fig. 104. *Chapoda panamana* Chickering; male chelicera, front view.
Fig. 105. *C. panamana* Chickering; male cheliceral teeth.
Fig. 106. *C. panamana* Chickering; tarsus of palp, ventral view.
Figs. 107–108. *C. panamana* Chickering; male palp, lateral view and palpal tibia, retrolateral view.

Abdomen. 1.21 mm. long, exclusive of anal tubercle almost a perfect oval in outline; longer than wide in ratio of 19 : 13; anal tubercle a short broad cone; six spinnerets rather slender, of moderate length, anterior pair stoutest and approximated at bases, posterior pair slenderer and somewhat longer than anterior pair, well spread so as to reveal middle pair clearly from a dorsal view; position of colulus not indicated; tracheal spiracle near base of spinnerets, without tubercle.

Color in alcohol. Carapace: generally brownish; eyes on black spots; interocular area dark brown; steep declivity and lateral sides with many dark brown streaks; ventral margin very dark brown; a few slender whitish hairs around eyes; behind PLE is a broad light brown bar extending laterally beneath PLE. Palps: tarsus yellowish; femur dark brown; other segments intermediate between these extremes. Chelicerae reddish brown. Lip amber; maxillae light amber. Sternum amber, dusted with brown flecks. Legs: first with brownish femur and patella, both lighter above; tibia yellowish white in basal two fifths, elsewhere brownish; metatarsus yellowish white in basal three fifths, elsewhere brown, tarsus yellowish white; other legs essentially the same with minor variations. Abdomen: ground color yellowish white with grayish brown markings which are difficult to describe adequately; near base dorsally there is one of these marks shaped more or less like a capital M, this connects posteriorly with a narrow medial bar across the middle, and the posterior quarter is covered by another much broader bar; lateral sides covered by short irregular and incomplete grayish brown and yellowish white narrow stripes; venter yellowish white except for a few faint small brownish spots and a narrow bar at level of tracheal spiracle.

Female allotype. Total length 3.20 mm. Carapace 1.50 mm. long, 1.09 mm. wide at PLE, .83 mm. tall and, therefore, .76 as tall as wide. Otherwise essentially as in male.

Eyes. Anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one fifteenth of the diameter of AME. Anterior row wider than posterior in ratio of 49 : 47, wider than middle row in ratio of 49 : 43. Quadrangle of laterals wider than long in ratio of 49 : 32. Total eye space occupies thirty-seven sixty-sevenths of the length of carapace. Ratio of eyes AME : ALE : PME : PLE = 17 : 9 : 2.5 : 9. Middle eyes closer to PLE than to ALE in ratio of 5 : 6. Height of clypeus equal to two seventeenths of the diameter of AME. Otherwise essentially as in male.

Chelicerae. Promargin of fang groove with five teeth, of which the two most medial are very small; retromargin appears to have three

like the male with the most medial a fissidentate tooth, but in one paratype female there are either four with the most medial a fissidentate tooth or, perhaps, five separate teeth with the two most medial merely crowded close together; in another paratype there are definitely six on the retromargin. Otherwise essentially as in male.

Maxillae, Lip, and *Sternum.* Essentially as in male except for minor details.

Legs. 4132. Tibial index of first leg 17, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.80	.47	.53	.40	.33	2.53
2.	.70	.40	.46	.37	.28	2.21
3.	.73	.40	.41	.50	.30	2.34
4.	.87	.40	.60	.66	.37	2.90

No fringes or special tufts on legs. A moderately well developed prolateral fringe of light colored hair on palpal tarsi.

Spines. First and second legs as in male. Third leg: femur and patella as in male; tibia as in male except ventral 0–1 (middle)–1p–0; metatarsus prolateral 0–1, ventral 0–2–2, retrolateral 1–1. Fourth leg: femur apparently only dorsal 0–1–0–1; patella 0; tibia as in third except ventral 0–1p–0–1r; metatarsus prolateral 0–2, ventral 0–1p–1r, retrolateral 0–1. Palpal spines: apparently only retrolateral tarsal 0–1–0, and tibial retrolateral 0–1–0.

Abdomen. 1.66 mm. long, longer than wide in ratio of 13 : 8. Otherwise essentially as in male.

Epigynum. A simple, somewhat swollen plate; without posterior marginal notch; somewhat in front of middle is a small white area bounded by curved lines (Fig. 103).

Color in alcohol. Almost identical to that of male; abdominal pattern still more obscure and difficult to describe adequately.

Type locality. Male holotype and female allotype from Canal Zone Biological Area, July, 1934. No male paratypes, but four female paratypes taken with Berlese funnel by Dr. Zetek in same locality, July, 1943–March, 1944; also one female taken in the same way and in same locality, April–May, 1942.

Phiale Group

Key to the genera in the Phiale Group

Every key thus far prepared has been found defective at one or more places. It is obviously very difficult to prepare a good key for

the separation of these genera, but the one given here may aid to some extent.

1. Retromargin of fang groove with a single, simple, more or less robust tooth 2
1. Retromargin of fang groove with a single distinctly fissidentate tooth 9
2. First tibiae with four pairs of ventral spines ..... *Monaga*, (p. 196)
2. First tibiae with three pairs of ventral spines, sometimes a single spine lacking 3
3. Male palpal tibia and patella short, broad, and with other outgrowths in addition to distal retrolateral apophysis; posterior row of eyes occupy nearly complete width of carapace at dorsal margin; carapace full three fourths as tall as wide; PME closer to PLE than to ALE; total eye space occupies slightly more than half the length of carapace; height of clypeus equal to about half the diameter of AME ..... *Compsodecta*, (p. 122)
3. Not with combination of characters given above 4
4. Female generally yellowish white with two dark brown dorsal stripes extending full length of body, also with a prominent brush of erect mixed yellowish and black hairs at base of abdomen contiguous to another similar brush at beginning of steep declivity on carapace; males with similar color pattern but modified and with reduced brushes; both sexes with a pair of lateral spines, among others, on first tibiae definitely offset toward ventral side; males with well developed black fringes on first and second legs ..... *Chira*, (p. 117)
4. Not with combination of characters given above 5
5. Rather large spiders, 8–10 mm. long; total eye space occupies considerably less than half the length of the carapace; PME about midway between ALE and PLE; males with two broad dark brown, dorsolateral stripes extending full length of body together with a narrow central light colored stripe and two lateral white stripes all extending full length of body; females with a similar but obscure pattern; anterior tibiae with only one lateral spine (prolateral) ..... *Plexippus*, (p. 240)
5. Not with combination of characters given above 6
6. Total eye space occupies less than half the length of carapace; PME closer to ALE than to PLE; lateral sides of carapace considerably wider at ventral margin than at dorsal margin, also with lateral sides nearly parallel; anterior coxae about as far apart as width of lip at base ..... *Phiale*, (p. 199)
6. Not with combination of characters given above 7
7. Size very variable in the different species, but often 8–9 mm. long; usually with very hairy legs and definite fringes; total eye space occupies about half or more than half the length of carapace; PME closer to PLE than to ALE; lateral sides of carapace more nearly vertical as well as nearly parallel; anterior coxae further apart than width of base of lip ..... *Corythalia*, (p. 125)
7. Not with combination of characters given above 8

8. Size very variable in the different species, but often 9–10 mm. long; usually with moderately hairy legs; total eye space occupies about half the length of carapace; PME either halfway between ALE and PLE or closer to ALE; lateral sides of carapace well rounded and not vertical, considerably wider at ventral margin than at dorsal margin; anterior coxae about as far apart as width of lip at base ..... *Freya*, (p. 163)
8. Size always small, about 4 mm. long; legs only moderately hairy and without fringes; total eye space occupies more than half the length of carapace; PME a little closer to PLE than to ALE; lateral sides of carapace more nearly vertical and nearly parallel; anterior coxae further part than width of base of lip ..... *Sidusa*, (p. 241)
9. Anterior tibiae with four pairs of ventral spines; posterior declivity of carapace about half-way from PLE to posterior border; PME considerably closer to PLE than to ALE ..... *Gorgasella*, (p. 192)
9. Anterior tibiae with three pairs of ventral spines; steep declivity of carapace begins almost immediately behind PLE; PME slightly closer to PLE than to ALE ..... *Chapoda*, (p. 113)

Genus Chapoda Peckham, 1896

The males of four different species of Chapoda are now known from Panama. They may be separated by the key which appears below. There are at least two species of females in my collection but no key has so far been found satisfactory for their separation.

Key to the males of Chapoda from Panama

1. Carapace with no tufts of erect hair medial to PME; palp: femur with a small ventral distal tubercle along promargin; patella nearly twice as long as broad; tibia incrassate but not ridged, broadest near middle.... *C. peckhami*, (p. 114)
1. Carapace with a tuft of short erect hairs on each side medial to PME; palp without combination of characters given above 2
2. Palp: femur with a large ventral tubercle just distal of middle; patella about four thirds as long as broad; tibia about as broad as long, broadest near distal end, strongly ridged ventrally ..... *C. festiva*, (p. 114)
2. Not with combination of palpal characters given above 3
3. Palp: femur with a large ventral tubercle just distal to middle, definitely divided distally into two terminal tubercles; patella about three halves as long as wide, with a blunt ventral tubercle just distal to middle; tibia about as broad as long, broadest near proximal end, flattened laterally but not ridged ventrally ..... *C. panamana*, (p. 114)
3. (Taken from F. Cambridge's description) Palp: femur without a ventral tubercle; patella about twice as long as broad, without any ventral tubercle; tibia a little longer than broad, broadest near distal end, not flattened laterally ..... *C. inermis*, (p. 114)

Chapoda festiva Peckham, 1896

Sidusa festiva F. Cambridge, 1901
C. festiva Simon, 1903
C. festiva Petrunkevitch, 1911

One male and two females from El Valle, R. P., July, 1936. Also several females from Canal Zone Biological Area about which there is considerable doubt. They are temporarily filed with this species. In addition to the distinctive features mentioned by the Peckhams and F. Cambridge, the trochanters of the male palps have a median blunt ventral tubercle of some prominence. In some species of the genus this tubercle becomes a prominent cone with bristles at its apex.

Chapoda inermis (F. Cambridge), 1901

Sidusa inermis F. Cambridge, 1901
C. inermis Simon, 1903
C. inermis Petrunkevitch, 1911
C. inermis Petrunkevitch, 1925

This species was reported from Panama by Profressor Petrunkevitch ('25), and the female was carefully described by him. The species has not appeared in my collection.

Chapoda peckhami Banks, 1929

The males of this species have been taken in considerable numbers in the Canal Zone Biological Area: June–July, 1934; July–Aug., 1936; June–Aug., 1939; also at El Valle, R. P., July, 1936, and Canal Zone Forest Reserve, Aug., 1939. No females have yet appeared in the collection.

Chapoda panamana spec. nov.

(Figures 104–108)

Male holotype. Total length 4.95 mm. Carapace 2.36 mm. long, 1.92 mm. wide opposite second coxae; much narrower on top than at ventral margin in true Chapoda form, ventral margin well rounded; third row of eyes extend a little beyond dorsal margin but occupy about five eighths of total width of carapace; whole interocular region with deposits of white guanin beneath the chitin; a considerable depression between PLE and behind them for some distance; begins to fall immediately behind PLE; with a short median longitudinal thoracic groove just a little behind posterior border of PLE; 1.28 mm. tall and, therefore, about two thirds as tall as wide. Two short tufts of brown-

ish hair, easily removed in handling, just medial to space between ALE and PME.

Eyes. Seen from in front, anterior row of eyes very strongly recurved with dorsal margins of AME on a level with middle of ALE. Anterior row longer than posterior row in ratio of about 11 : 10; middle row shorter than posterior row in ratio of 57 : 62. Quadrangle of laterals wider in front than long in ratio of 67 : 46. Total eye space occupies just a little less than half the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 21 : 13 : 3 : 12. AME separrated from one another by one twenty-first of their diameter, from ALE by two twenty-firsts of their diameter. Middle eyes slightly closer to PLE than to ALE. Height of clypeus equal to one third of the diameter of AME. Clypeus with a scant fringe of white hairs along ventral margin, and three stiff bristles in ventral angle between AME arranged in a triangle.

Chelicerae. Parallel, vertical, not much produced, medial edges straight and rather closely apposed, outer margin sinuous with a distinct broadening near base (Fig. 104), distinctly flattened over front surface and finely rugulose. Fang of moderate size, evenly curved. Fang groove with two teeth of moderate size on promargin near medial end; a single distinctly fissidentate tooth on retromargin (Fig. 105).

Maxillae. Parallel, longer than wide in middle in ratio of about 2 : 1, moderately concave along outer border and moderately dilated distally, outer distal corner well rounded, well developed scopula along truncature.

Lip. Longer than wide in ratio of about 4 : 3, widest at base, nearly as wide three fifths from base, much narrowed from there to distal border which is narrow with few bristles. Sternal suture gently procurved.

Sternum. Broadly scutiform, narrowly margined, longer than wide in ratio of 20 : 17, widest between second coxae, posterior end very blunt and not extended between fourth coxae which are separated by only one sixth of their diameter.

Legs. 4312. Tibial index of first leg 16, of fourth leg 12.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.60	.86	1.15	1.08	.47	5.16
2.	1.50	.77	1.02	1.02	.45	4.76
3.	1.58	.70	1.15	1.41	.58	5.42
4.	1.64	.71	1.28	1.44	.57	5.64
Palp	.78	.52	.35	—	.52	2.17

All coxae of about equal length and size. With moderate supply of hair but with no fringes.

Spines. First leg: femur dorsal 0–1–1–1, prolateral and retrolateral 0–0–0–2, ventral 0; patella prolateral and retrolateral 0–1–0; tibia dorsal 0, prolateral and retrolateral 1–1–1, ventral 2–2 (not well paired) –2; metatarsus dorsal 0, prolateral and retrolateral 1–1. Second leg: as in first. Third leg: femur and patella as in first; tibia dorsal right 1–0–0, left 0, prolateral and retrolateral 1–1–1, ventral 1p–0–2; metatarsus dorsal 0, prolateral and retrolateral 1–2, ventral 0–2–2. Fourth leg: femur and patella as in first; tibia dorsal 1–0–0, elsewhere as in third; metatarsus dorsal 0, prolateral and retrolateral 1–1–2, ventral 0–1p–2 (right and left sides differ somewhat). Palpal spines: only femur dorsal 0–1–1–0; tubercle of trochanter ends in a stiff black spine.

Palp. All segments except coxa at least somewhat modified (Figs. 107–108). Trochanter with a long ventral tubercle ending in a slender spine; femur with a small dorsal cap of white hairs, two dorsal spines, and a bifurcate ventral extension; patella narrow at base but much widened in distal half; tibia as wide near base as long, with a stout retrolateral distal spur; tarsus closely resembles that of other species in the genus.

Abdomen. Generally ovoid, longer than wide in ratio of about 8 : 5, widest about three eighths from base; posterior end quite sharply pointed; anal tubercle a broad somewhat flattened cone; whole dorsal area with many small white deposits beneath chitin excepting the cardiac region which is entirely free of them; spinnerets rather slender, anterior pair somewhat the most robust, middle pair somewhat the slenderest, middle and posterior pair nearly in a straight line so that middle pair is not surrounded by others. Position of colulus indicated as a small chitinized plate and a small tuft of black bristles. Tracheal spiracle apparently near to base of spinnerets.

Color in alcohol. Chelicerae and palps a deep amber except for the white cap on the palpal femur. Lip and maxillae reddish brown with yellowish tips. Legs: first and second tibiae and metatarsi reddish brown, all other pedal segments yellowish. Sternum yellowish. Carapace: entire interocular space white from presence of chalky deposits beneath chitin; elsewhere reddish brown with posterior slope somewhat lighter and lateral sides darker because of a fairly copious supply of dark hair; a few white hairs along ventral margin and irregularly scattered elsewhere (probably much worn by handling). Abdomen: whitish dorsally from subchitinous white deposits; dorsolaterally and laterally

somewhat streaked and spotted with grayish; venter yellowish and with a broad dusky stripe which rounds off posteriorly and does not reach base of spinnerets.

Type locality. Holotype male from Canal Zone Biological Area, Aug., 1939. Three male paratypes from the following localities; Canal Zone Biological Area, June, 1939; Ft. Davis, C. Z., Aug., 1936; Ft. Sherman, C. Z., Aug., 1939.

Genus Chira Peckham, 1896

Chira designata Peckham, 1896

Figures 109–115

Shira designata Peckham, 1896
S. designata F. Cambridge, 1901
C. designata Simon, 1903
C. designata Petrunkevitch, 1911
C. designata Petrunkevitch, 1925

This species was described from a female sent from Panama to the Peckhams by Count Keyserling. The Peckhams gave only a brief description and one figure of the face and chelicerae. F. Cambridge did not have the species in his collection, but he considered it to be a member of his Phidippeae. Simon placed it in his system in the Vicirieae, division of the Unidentati. I believe I have both sexes in my collection from localities in the lowlands, none from the mountainous regions of Panama. The male is a strikingly beautiful creature and it seems a little strange that it has not shown up in collections from Panama before this. I thought it likely that it had been assigned to some other genus if it had been found, but I have been unable to locate it anywhere. A detailed description of what I consider the male allotype and female hypotype is herewith given.

Male allotype. Total length 6.14 mm. Carapace 2.61 mm. long, 1.98 mm. wide a short distance behind PLE which occupy about thirteen eighteenths of the width of the carapace at their level, well rounded along lateral sides, with the top of the carapace much narrower than ventral margin, ascent gentle from AME to PLE, then descent is gentle for slightly more than half the way to posterior border where the steep declivity begins (Fig. 109). Short median longitudinal thoracic groove lies between posterior borders of PLE.

Eyes. Seen from above, anterior row quite strongly recurved with dorsal borders of ALE level with that of AME. Anterior row slightly

wider than posterior in ratio of 65 : 62. Middle row shorter than posterior row in ratio of 59 : 62. Quandrangle of laterals wider than long in ratio of about 7 : 5. Total eye space occupies just slightly more than half the length of carapace. Ratio of eyes AME : ALE : PME : PLE = 24 : 11 : 2.5 : 11. AME separated from one another by one twelfth of their diameter, from ALE by about two twelfths of their diameter. Middle eyes closer to ALE than to PLE in ratio of 11 : 18. Height of clypeus equal to nine twenty-fourths of diameter of AME. A few long white bristles from clypeus overhang base of chelicerae and converge toward middle.

Chelicerae. Vertical, essentially parallel in basal two thirds, somewhat divergent in distal third, robust but not produced, basal segment somewhat excavated along dorsal margin of retrolateral surface, somewhat gibbous in front, no boss visible. Fang of moderate size, somewhat sinuous. Fang groove mildly excavated; with a fairly robust bidentate tooth on promargin near medial end; with a single fairly robust tooth on retromargin (Fig. 110).

Maxillae. Parallel, longer than wide in the middle in ratio of about 2 : 1, very concave along outer border, dilated distally, drawn out into a distinct hook at outer distal angle (Fig. 111); with well developed scopula along truncature and medial edge of nearly whole segment.

Lip. Almost exactly as wide at base as long, gradually narrowed from base, only a few stiff bristles at tip. Sternal suture straight.

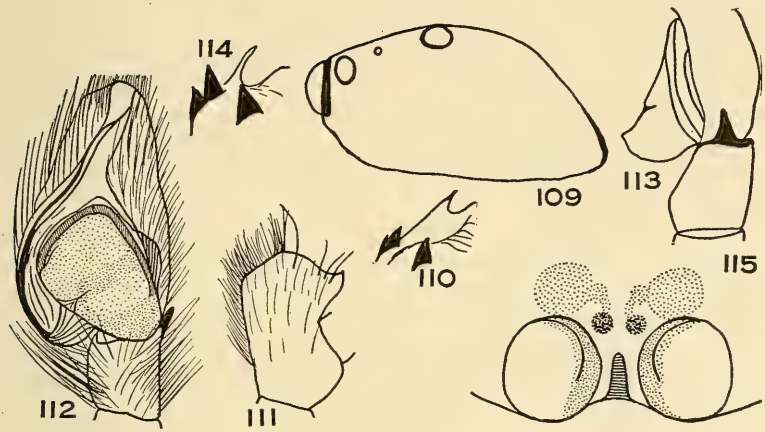
Sternum. Generally scutiform, longer than wide in ratio of about 4 : 3, not narrowed much anywhere, widest opposite second coxae, very blunt at posterior end and not extended between fourth coxae which are separated by only three twentieths of their diameter.

Legs. 4312. Tibial index of first leg 15, of fourth leg 12.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.73	.90	1.41	.98	.72	5.74
2.	1.73	.83	1.30	1.02	.77	5.65
3.	1.92	.83	1.34	1.54	.77	6.40
4.	1.92	.75	1.54	1.75	.77	6.73
Palp.	.86	.33	.28	—	.71	2.18

First coxae somewhat the most robust, fourth coxae somewhat the longest. First leg somewhat the most robust. First two pairs of patellae and tibiae with moderately developed black fringes.

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral and retro-



External Anatomy of Spiders

Fig. 109. *Chira designata Pk.*, carapace, lateral view.
Fig. 110. *C. designata* Pk., male cheliceral teeth.
Fig. 111. *C. designata* Pk., male maxilla.
Figs. 112–113. *C. designata* Pk., male palp, ventral view; palpal tibia and tarsus, retrolateral view.
Fig. 114. *C. designata* Pk., female cheliceral teeth.
Fig. 115. *C. designata* Pk., epigynum, ventral view.

lateral 0–0–0–0–2, ventral 0; patella only prolateral and retrolateral 0–1–0; tibia dorsal 0, prolateral and retrolateral 1–1–1, ventral 2–2–2 (the last laterals are so far offset ventrally as to simulate ventrals); metatarsus dorsal 0, prolateral and retrolateral 1–1, ventral 2(very long)–2. Second leg: as in first. Third leg: femur as in first except prolateral 0–0–0–1–2; patella as in first; tibia dorsal 1–0–1r, prolateral and retrolateral 1–1–1, ventral 0–1p–2; metatarsus dorsal 0, prolateral 1–0–0–2, retrolateral 1–1–0–1, ventral 2–2. Fourth leg: femur and patella as in first; tibia dorsal 0–0–2 (could be regarded as lateral), prolateral and retrolateral 1–1–1, ventral 0–1p–0–2; metatarsus dorsal 0, prolateral and retrolateral 1–1–2, ventral 2–2. Palpal spines: only femur dorsal 2 at tip.

Palp. Both patella and tibia short, the former a little longer than the latter. Tibial retrolateral apophysis a rather small simple spur. Bulb very strongly swollen, with embolus originating at prolateral basal corner and passing along prolateral margin and forward and across to the canal of the cymbium (Figs. 112–113).

Abdomen. Slender, relatively broad at base, longer than wide in ratio of 27 : 10, widest about one fourth from base, then tapered to nearly a point. Base with a tuft of mixed white and dark hair which projects toward carapace but does not make a marked cushion or brush as in female. Anal tubercle a broad flattened cone. Anterior spinnerets fairly robust; posterior pair rather slender and one third longer than anterior pair; middle pair slenderest but as long as anterior pair, surrounded (hidden) by others. Position of colulus shown by a black spot and a few bristles. Position of tracheal spiracle near base of spinnerets marked by a small, more heavily chitinized lip.

Color in alcohol. Legs: first coxae nearly black, second dark ventrally and prolaterally, third only dark ventrally, and fourth only tipped with dark ventrally; elsewhere all coxae yellowish; third and fourth legs distal to coxae entirely yellowish; first and second legs with distal tips of femora, patellae, tibiae and metatarsi very dark brown with some whitish hairs and a good deal of greenish iridescence; first and second tarsi and most of first and second femora yellowish. Chelicerae dark reddish brown except the fang and distal parts of basal segment which are amber. Carapace: with a broad dark brown marginal stripe which passes forward and across the clypeus; in middle of posterior border the dark marginal stripe reaches up over the posterior declivity to join the dark interocular area behind which is a small white spot (easily removed by rubbing) in the region of the thoracic groove; remainder of lateral sides white. Abdomen: a median yellow-

ish white stripe and two dark gray stripes (probably black in life) cover dorsal region; also with a white dorsolateral stripe on each side, thus making five stripes visible when animal is viewed dorsally; nearly entire venter is dark gray including spinnerets.

Female hypotype. Total length 6.65 mm. Carapace 2.56 mm. long, 1.79 mm. wide just a little behind third row of eyes which occupy about three fourths of width of carapace at their level, lateral ventral margin less rounded than in male; whole carapace quite hairy with a pronounced brush of erect yellowish white and black hair along posterior declivity. Otherwise essentially as in male.

Eyes. Essentially as in male. Clypeus covered with a heavy coating of long white hair.

Chelicerae. Vertical, parallel, of moderate size, not modified as in male; fang of moderate size, evenly curved. Fang groove distinct, with two clearly defined teeth along promargin (very close together) and a single simple tooth of moderate size along retromargin as in male (Fig. 114).

Maxillae. Essentially as in male except that the outer border is only slightly concave and the outer distal corner is not modified into a hook as in male.

Lip and *Sternum.* Essentially as in male.

Legs. 4312. Tibial index of first leg 18, of fourth leg 12.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.38	.76	1.02	.75	.62	4.53
2.	1.30	.76	.94	.70	.62	4.32
3.	1.60	.70	1.02	1.26	.70	5.38
4.	1.73	.74	1.41	1.50	.70	6.08

No fringes on legs. Otherwise essentially as in male.

Spines. First leg: femur as in male except retrolateral 0–0–0–0–1; patella as in male except retrolateral 0; tibia as in male except prolateral 1–1–0 and retrolateral 0; metatarsus only ventral 2–2. Second leg: femur and patella as in male; tibia dorsal 0, prolateral 1–1–0, retrolateral 1–0–1, ventral 2–2–1p–2; metatarsus only prolateral 1–1, ventral 2–2. Third leg: femur dorsal 0–0–1–1–1, prolateral 2 near distal end and retrolateral only 1 near distal end; patella as in male; tibia dorsal 0, prolateral 0–1–1–0, retrolateral 1–1–1, ventral 1p–0–2; metatarsus dorsal 0, prolateral 1–0–2, retrolateral 1–1–2, ventral 2–2. Fourth leg: femur as in third except prolateral 1 near distal end and retrolateral the same; patella as in male; tibia only prolateral and retro-

lateral 1–1–1, ventral 1p–0–2; metatarsus only prolateral and retrolateral 1–1–1, ventral 2–2. Palp with tarsus and tibia thickly covered with white hair.

Abdomen. With a strongly developed brush of mixed white and dark hairs at base (much more strongly developed than in male). Basal abdominal brush and thoracic brush fill in space between the two main parts of body in a very characteristic way. Otherwise essentially as in male.

Epigynum. With two deep, large depressions separated by a well developed septum; a shallow posterior marginal notch which extends into a slender tube (Fig. 115).

Color in alcohol. All appendages and sternum yellowish white. Carapace entirely yellowish white on lateral sides and clypeus, with a narrow median yellowish white stripe extending from posterior border up the steep declivity and forward into the interocular region where it merges with the color of that area; two dorsolateral dark brown stripes starting at ALE extend back nearly to posterior border. Abdomen: with a median yellowish white stripe from base nearly to spinnerets; two dark brown dorsal stripes extend from base to posterior end where they unite; elsewhere yellowish white except a few small dark spots in region of tracheal spiracle.

Type locality. Male allotype and female hypotype from Canal Zone Biological Area, June, 1939. Male paratypes and females from the following localities: Canal Zone Biological Area, June–July, 1934; June and Aug., 1936; June–Aug., 1939; Arraijan and Porto Bello, R. P., Aug., 1936; Ft. Randolph, C. Z., Aug., 1936; Ft. Sherman, Madden Dam, and Canal Zone Forest Reserve, C. Z., Aug., 1939.

Genus Compsodecta Simon, 1903

Compsodecta montana spec. nov.

Figures 116–118

Compsodecta grisea (Pk.), the genotype, was described from Jamaica along with *C. albopalpis* (Pk.) as a species of Cybele. F. Cambridge ('01) described *Sidusa maxillosa* and stated his inclination to regard it as a new genus because of differences from others which he left in Sidusa. He noted the general resemblance of *S. maxillosa* to *Chapoda festiva* Pk. in respect to palpus and epigynum. The species under consideration here has palpal characters which strongly suggest Chapoda, but other features suggest that it is more closely related to *C. maxillosa*

(F. Cambridge). Altogether, I deem it safer to leave the species in the genus Compsodecta but I am not at all certain of its correct position.

Male holotype. Total length 4.74 mm. Carapace 2.18 mm. long, 1.60 mm. wide at level of posterior row of eyes which occupy fourteen fifteenths of width of carapace at that level; gently arched from AME to beginning of posterior declivity which starts about four fifths of length of carapace with highest point just in front of anterior border of PLE, 1.28 mm. tall and, therefore, slightly more than three fourths as tall as wide. No special modifications of this part of body. Longitudinal median thoracic groove short, between posterior borders of PLE.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of AME and ALE are almost exactly on a level. Anterior row only slightly wider than posterior row. Middle row shorter than posterior row in ratio of 13 : 14. Total eye space occupies just slightly more than one half the length of carapace. Ratio of eyes AME : ALE : PME : PLE = 20 : 12 : 2.5 : 11. AME separated from one another by one tenth of their diameter, from ALE by one fifth of their diameter. Middle eyes closer to PLE than to ALE in ratio of 11 : 13. Height of clypeus equal to nine twentieths of diameter of AME. Clypeus decorated with a few whitish hairs and bristles along ventral margin and three upturned bristles in lower angle between AME.

Chelicerae. Fairly robust, not produced, parallel, finely rugulose on prolateral surface; fang moderately slender and evenly curved. Fang groove with two promarginal teeth near inner end, one very small; with a single simple retromarginal tooth.

Maxillae. Slightly convergent; longer than wide at indenture in ratio of 30 : 13; deeply indented along outer margin about one third from tip; palp inserted over more than basal half; without a sharp tooth as in *C. maxillosa* (F. Cambridge); distal end moderately dilated with outer distal corner angular; with well developed scopula along truncature.

Lip. Longer than wide at base in ratio of 20 : 17, basal excavations reach about half length of organ; reaches nearly two thirds the length of maxillae; widest at base, narrowed to tip. Sternal suture straight.

Sternum. Generally scutiform; longer than wide in ratio of about 4 : 3, widest between second coxae, as wide anteriorly as base of lip; terminates posteriorly in a blunt end which does not extend between fourth coxae which are separated by one sixth of their diameter.

Legs. 1432. Tibial index of first leg 19, of fourth leg 15.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.28	.77	.96	.83	.50	4.34
2.	1.15	.70	.77	.70	.41	3.73
3.	1.28	.70	.77	1.00	.49	4.24
4.	1.34	.62	.83	1.03	.48	4.30
Palp	.75	.56	.34	—	.43	2.08

First pair of legs considerably the most robust.

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral and retrolateral 0–0–0–0–2, ventral 0; patella only prolateral and retrolateral 0–1–0; tibia dorsal 1–0–0, prolateral 0–1–1–0, retrolateral 1–1–0, ventral 2–2(staggered)–2; metatarsus dorsal 0; prolateral and retrolateral 1–1, ventral 1r–2. Second leg: femur and patella as in first; tibia as in first except prolateral 1–1–1 and ventral 1r–2–2; metatarsus as in first except ventral 2–2. Third leg: femur and patella as in first; tibia dorsal 1–0–0, prolateral and retrolateral 1–1–1, ventral 1p–0–2; metatarsus dorsal 0, prolateral and retrolateral 1–2, ventral 2–2. Fourth leg: femur and patella as in first except a dorsal distal long stiff bristle on patella; tibia as in third except ventral 0–1p–2; metatarsus dorsal 0, prolateral and retrolateral 1–1–2, ventral 0–1p–2. Palpal spines: apparently only femur dorsal 0–0–1–0.

Palp. Trochanter with a strongly chitinized dorsal tubercle; femur moderately curved, with a few white hairs on distal half of dorsal side, and what appears to be a reduced ridge or tubercle at distal end; patella somewhat flattened dorsoventrally and almost as wide as long, longer than tibia in ratio of about 28 : 17, a low robust prolateral tubercle; tibia short and broad, with a conspicuous prolateral process near the middle and a retrolateral terminal apophysis which is very broad basally but pointed distally; tarsus is short, broad, very simple, with an embolus like a short spine curved forward from an oval base (Figs. 116–118).

Abdomen. Ovoid, broad at base, longer than wide in ratio of 5 : 3; anal tubercle a fairly prominent flattened cone; spinnerets all slender, anterior and posterior pairs about equally robust with middle pair the slenderest and exposed dorsally because posterior pair is wide apart. No colulus visible. Tracheal spiracle apparently near base of spinnerets but hidden.

Color in alcohol. Palps and chelicerae a reddish brown amber with lip and maxillae somewhat lighter with yellowish tips. First pair of legs generally reddish brown with femora nearly black except ventrally and dorsally at distal end, with yellowish tarsi. Second pair of legs

much the same as first pair except femora are yellowish dorsally at both proximal and distal ends. Third and fourth pairs of legs: proximal halves of femora yellowish, distal halves brown; other segments yellowish and more or less ringed with reddish brown. Carapace: eyes on black spots with more or less reddish hair around AME and ALE; an elongated white spot from median thoracic groove nearly to posterior border; opposite posterior eyes an irregular broad white marginal stripe extends back to outer posterior corner (loose hairs of which it is composed easily rubbed off); a fairly dense covering of brown hair over lateral sides and posterior declivity (probably in life also on interocular area). Sternum yellowish. Abdomen: yellowish on dorsum with many faint dots, irregular spots, and central chevrons; venter with a darker central broad stripe narrowed at genital groove and interrupted at base of spinnerets.

Type locality. Male holotype from Boquete, R. P., July, 1939. No paratypes.

Genus Corythalia C. Koch, 1850

With the publication of Professor Petrunkevitch's work on Panamanian spiders ('25) ten species of the genus Corythalia became known: *C. albicincta* (F. Cambridge), *C. bicincta* Petrunkevitch, *C. nigriventer* (F. Cambridge), *C. panamana* Petrunkevitch, *C. pulchra* Petrunkevitch, *C. quadriguttata* (F. Cambridge), *C. spiralis* (F. Cambridge), *C. spirobis* (F. Cambridge), *C. sulphurea* (F. Cambridge), *C. voluta* (F. Cambridge). Chamberlin ('25) described a male *Saitis canalis* from the Canal Zone Biological Area. Mr. Banks ('29) transferred this species to the genus Corythalia. Mr. Banks also described *C. obsoleta* and identified the following from the Canal Zone region: *C. bicincta* Petrunkevitch, *C. conspecta* (Peckham), *C. murcida* (F. Cambridge), *C. panamana* Petrunkevitch, and *C. spiralis* (F. Cambridge). I am obliged to consider the specimens identified as *C. murcida* (F. Cambridge) as the females of *C. spiralis* (F. Cambridge), thus leaving the species unrecorded from Panama. R. V. Chamberlin and Wilton Ivie ('36) described seven new species from the Canal Zone which are here considered to belong to the genus Corythalia: *C. conformans, C. clara, C. diffusa, C. sitticus, Sidusa tulineba, Freya serrapophysis,* and *C. endigma.* I believe *C. conformans* C. and I. is a synonym of *C. sulphurea* (F. Cambridge). *C. diffusa* C. and I. appears to be the same as *C. conspecta* (Pk.) and *C. sitticus* is probably the same as *C. bicincta* Petrunkevitch. *Sidusa tulineba* seems to be the

male of *C. bicincta* Petrunkevitch. *Freya serrapophysis* is probably nearer to Corythalia than to Freya and, therefore, it has been transferred to that genus. *C. endigma* is listed by its joint authors on page five of their paper ('36) and a figure of the epigynum is given on page seventy-nine but I can find no description in the text. I believe, however, that it is a synonym of *C. obsoleta* Banks. *C. opima* (Pk.) and *C. parvula* (Pk.) are reported here for the first time from Panama. I have also described two new species under the names: *C. bryantae* sp. nov. and *C. modesta* sp. nov.

As the genus is treated in this paper, therefore, we now know of nineteen species of Corythalia from Panama which may be listed as follows: *C. albincincta* (F. Cambridge), *C. bicincta* Petrunkevitch, *C. bryantae* sp. nov., *C. canalis* (Chamberlin), *C clara* Chamberlin and Ivie, *C. conspecta* (Peckham), *C. modesta* sp. nov., *C. nigriventer* (F. Cambridge), *C. obsoleta* Banks, *C. opima* (Peckham), *C. panamana* Petrunkevitch, *C. parvula* (Peckham), *C. pulchra* Petrunkevitch, *C. quadriguttata* (F. Cambridge), *C. serrapophysis* (Chamberlin and Ivie), *C. spiralis* (F. Cambridge), *C. spirorbis* (F. Cambridge), *C. sulphurea* (F. Cambridge), and *C. voluta* (F. Cambridge). Among these *C. spirorbis* and *C. bryantae* are known only from males, while *C. clara, C. modesta, C. quadriguttata* and *C. voluta* are known only from females. I have in my collection representatives of all of the known species except the following: *C. albicincta, C. nigriventer, C. panamana, C. quadriguttata,* and *C. spirorbis.*

Key to the species of Corythalia from Panama

Males

1. Chelicerae excavate along medial margin in front. . *C. nigriventer,* (p. 143)
1. Chelicerae not excavate along medial margin in front. 2
2. With no definite fringes on any pair of legs. 4
2. With definite fringes on at least one pair of legs. 3
3. With definite fringes only on first pair of legs; palp: tibial retrolateral apophysis long, sinuous, and somewhat clavate distally, the embolus with a double spiral. . . . . *C. spirorbis,* (p. 162)
3. With definite fringes on more than first pair of legs; palpal features other than those given above. 5
4. Carapace with a pair of short broad marginal posterolateral white or yellowish stripes; abdomen with narrow light and broad dark dorsal bands; embolus curled nearly into a complete ring; tibial retrolateral apophysis a long slender terminally blunt filament. . *C. sulphurea,* (p. 162)

4. Carapace without definite marginal posterolateral stripes; abdomen with no dorsal bands, but with stripes instead; embolus distinctly spiraloid, not ring-like; tibial retrolateral apophysis a stout spur, serrated distally *C. serrapophysis*, (p. 153)
5. Definite fringes on first and second pairs of legs (*albicincta, conspecta, canalis,* and *parvula*) 6
5. Definite fringes on third pair of legs as well as on first and second pairs (*bicincta, bryantae, obsoleta, opima, panamana, pulchra,* and *spiralis*) ... 9
6. Palpal tibial apophysis long, slender, bifurcated at tip; clypeus and anterior row of eyes with a dense covering of dull orange scale-like hairs *C. parvula*, (p. 146)
6. Not with combination of characters given above 7
7. Palpal tibial apophysis a simple spur, broad at base and tapered to a fine point distally; clypeus covered with converging yellowish white hair; carapace with a thick coat of yellowish white hair in a stripe on each side from ALE to just behind PLE where the two stripes meet in a transverse band ..... *C. canalis*, (p. 136)
7. Not with combination of characters given above 8
8. Palpal tibial apophysis short and stout; first and second tibiae flattened dorsally and prolaterally to form spinigerous ridges .*C. conspecta* ,(p. 141)
8. Palpal tibial apophysis long, slender, filiform; embolus widened toward tip; first and second tibiae cylindrical as usual ..... *C. albicincta*, (p. 132)
9. Abdomen with a dorsal black irregularly quadrilateral figure in center of which is a small white spot; clypeus with two white bands and usually also with a white band on base of chelicerae; distal half of palpal femur and patella clothed with white scales ..... *C. bicincta*, (p. 132)
9. Not with combination of characters given above 10
10. Clypeus without special decorations; carapace with a broad white marginal band on each side from opposite PLE to posterolateral corner; palpal tibial apophysis long, filiform, usually divergent; embolus spiraloid with two complete turns ..... *C. spiralis*, (p. 158)
10. Not with combination of characters given above 11
11. Clypeus with two bands of white scales (somewhat as in C. bicincta) but chelicerae with isolated white scales; carapace without white marginal stripes; tibial apophysis a stout spur of moderate length, serrated on inner surface; embolus grooved and broadened before but not at tip ..... *C. obsoleta*, (p. 145)
11. Not with combination of characters given above 12
12. Clypeus without special decorations; carapace with a broad white marginal stripe on each side; palpal tibial apophysis robust; embolus robust and makes considerably less than a full turn of a spiral .. *C. panamana*, (p. 145)
12. Not with combination of characters given above 13
13. Carapace with two dorsal narrower white stripes as well as the broad marginal white stripes; a somewhat triangular dorsal abdominal red spot; palpal tibial apophysis long, filiform; embolus fairly long, slender, and with one and a half turns of a spiral ..... *C. opima*, (p. 145)

13. Not with combination of characters given above.....14
14. Clypeus with a ventral fringe of loose white scales which continue laterally to first coxae; carapace with a broad lateral white stripe on each side, a patch of white scales between ALE, a small patch of white scales between PME and PLE, a patch of white scales behind and below PLE, with many grayish-yellow scales on head; palpal tibial apophysis long and slender; embolus rather short, with about one full turn of a loose spiral.....
C. pulchra, (p. 150)

14 Clypeus with a well developed white fringe; carapace with a narrow white ventral marginal stripe and loose white scales generally distributed; abdomen with many golden yellow scales together with several light and dark stripes and bands; palpal tibial apophysis a long slender filament; embolus makes about one full turn of a spiral, distally pointed .....
C. bryantae, (p. 132)

Females

1. Carapace with definite broad white or light colored stripes (*bicincta*, *conspecta*, *modesta*, *nigriventer*, *opima*, *panamana*, *pulchra*, *quadriguttata*, *serrapophysis*, *spiralis*, and *sulphurea*).....7
1. Carapace without definite broad white or light colored stripes (*albicincta*, *canalis*, *clara*, *obsoleta*, *parvula*, and *voluta*).....2
2. Carapace generally dark brown with a few small white patches easily removed by handling; abdomen black dorsally in anterior half, posterior half with several short narrow dark and light transverse bands and a single broad somewhat obscure light band about the middle; epigynum with a pair of large light colored areas nearly contiguous medially and two pairs of spermathecae dorsal to these areas..... *C. obsoleta*, (p. 145)
2. Not with combination of characters given above.....3
3. Carapace brownish with many whitish hairs generally distributed (easily removed by handling); clypeus with an inconspicuous whitish fringe; abdomen yellowish with many small black spots and two irregular narrow black bands near middle; epigynum with a pair of very small, light colored areas each with an oval black spot, and a pair of relatively large spermathecae nearly contiguous just in front of posterior margin. *C. clara*, (p. 140)
3. Not with combination of characters given above.....4
4. Carapace generally brown with few decorations except many iridescent scales over much of dorsal area; clypeus without the light colored decorations so characteristic of male; abdomen brownish mottled, with a fairly broad central dorsal light stripe enclosing in posterior half several light and dark chevrons; epigynum without usual large whitish areas, with a pair of small depressions near center of plate and two large reniform spermathecae at outer lateral corners connected with a pair of small spermathecae near center of plate..... *C. canalis*, (p. 136)
4. Not with combination of characters given above.....5

5. Carapace with a narrow white marginal boundary from PLE to posterolateral corner, almost black in ocular region, streaked laterally; clypeus without special decoration; abdomen black at base and laterally, anterior quarter of dorsum with yellowish scale-like hair, remainder of dorsum dark brown with two pairs of yellowish dorsolateral bars or spots; epigynum with two large circular areas and two pairs of spermathecae the more anterior pair mostly in front of circular areas ..... *C. parvula*, (p. 146)
5. Not with combination of characters given above 6
6. Carapace generally dark brown with white scales in interocular area, a white ventral marginal stripe and clypeus with a distinct white fringe and white scales around AME; abdomen black at base with a pair of narrow white basal oblique bars, near middle is a narrow white dorsal bar broken in middle which separates a pair of small black spots from a pair of larger black spots margined behind in white; epigynum with a pair of whitish areas occupying anterior half of plate separated by a low but distinct septum, and bounded laterally by elongated shallow slits .. *C. voluta*, (p. 163)
6. (Taken from F. Cambridge's description) "Carapace brown, with a pale spot of hairs between the lateral eyes, two pale spots on each side of the central stria, and a posterior marginal band of white scales. Abdomen brown, with a black anterior marginal band, followed by a thin encircling white line extending obliquely a little down the sides; a pair of oblique white spots lie above the spinners and are connected with a circular transverse narrow white cincture just behind the middle". Epigynum with a pair of circular whitish areas occupying nearly entire plate, contiguous, with two pairs of spermathecae, the more anterior pair about half in front of circular areas ..... *C. albicincta*, (p. 132)
7. Carapace with a pair of yellowish or whitish ventrolateral stripes behind PLE; clypeus without special decorations; abdomen with a light dorsal band near base, another near middle, and a series of short light and dark dorsal bands in posterior quarter; epigynum with a pair of circular areas occupying anterior half of plate and a pair of larger circular spermathecae between circular areas and posterior margin ..... *C. sulphurea*, (p. 162)
7. Not with combination of characters given above 8
8. Carapace with a central dorsal light stripe from between PLE to posterior border and a ventral marginal whitish stripe passing across clypeus; abdomen with four dorsal and dorsolateral brownish stripes separated by three yellowish white stripes; epigynum with a pair of small, brown, strongly chitinized circular areas more than half a diameter of one of them apart, and a pair of larger circular spermathecae contiguous ..... *C. serrapophysis*, (p. 153)
8. Not with combination of characters given above 9
9. Carapace with a wide lateral white stripe, a large white spot between ALE, a small white patch on each side between PME and PLE, and a white patch on each side behind PLE; clypeus only with a row of white ventral

scales; abdomen with an irregular dorsal black band near middle, two black dorsal spots in posterior third, elsewhere with many yellowish scales; epigynum with a pair of small somewhat circular areas and a pair of elongated spermathecae lying transversely between circular areas and posterior margin ..... *C. pulchra*, (p. 150)

9. Not with combination of characters given above 10

10. Carapace generally brown, a small white spot between PME and PLE, another small white spot behind PLE, and a single median white spot at beginning of posterior declivity, and a broad marginal white stripe from opposite PLE to posterolateral corner; clypeus with a narrow band and a fringe of white scales; abdomen with a black basal spot, a white basal band which continues laterally to near middle, then a broad black somewhat oblique bar which continues to lateral sides, then a chestnut brown band followed by a narrow white band nearly divided medially, then another broader chestnut brown band continuous with another shorter chestnut brown bar, the two chestnut brown bands being separated by a pair of narrow short white bars; epigynum with an obscure central septum separating two circular areas each with an oval spot near anterior border, and four spermathecae, two in front of circular areas and two elongated ones on lateral boundaries of plate ..... *C. spiralis*, (p. 158)

10. Not with combination of characters given above 11

11. Carapace with an oblique white bar behind PLE, the two nearly meeting medially, a white patch between PME and PLE, a ventral marginal white stripe from opposite PLE to posterolateral corner; clypeus with a white ventral fringe and a narrow white band; abdomen generally yellowish, with a large black dorsal spot in anterior half bearing in its center a small white spot, in posterior half a series of black bars; epigynum with a pair of large, somewhat oval, whitish areas nearly contiguous medially, a pair of small spermathecae mostly in front of whitish areas, and a larger pair of spermathecae occupying posterior halves of these areas ..... *C. bicincta*, (p. 132)

11. Not with combination of characters given above 12

12. Carapace with many white scales in ocular region and behind PLE to steep declivity, and a moderately well defined white ventral marginal stripe; clypeus with a white ventral fringe; abdomen with a whitish broken basal band extending laterally about half the length of the region, a broad central dorsal irregular light stripe with two pairs of distinct black spots bounding it laterally near middle; epigynum with a continuous recurved anterior margin behind which are two circular areas separated from one another by nearly a diameter of one of them, remote from posterior margin, spermathecae in form of elongated tubules ..... *C. conspecta*, (p. 141)

12. Not with combination of characters given above 13

13. Carapace with a broad white lateral stripe from opposite PME to posterolateral corners, with white scales around first row of eyes; clypeus with a white ventral fringe and many white scales irregularly distributed; abdo-

men with a central dorsal light colored band separating the brownish anterior half from a brownish band in posterior third; epigynum with two large oval whitish areas occupying nearly entire plate and nearly contiguous medially, with a pair of rather small oval spermathecae at anterior lateral corners of plate and mostly beyond margin of whitish areas..... *C. panamana*, (p. 145)

13. Not with combination of characters given above.....14
14. Carapace with a broad lateral stripe from opposite PLE to posterolateral corners, many white scales in interocular area, with a pair of curving white stripes from PLE to top of posterior declivity where they nearly meet; clypeus with a ventral fringe of loose white scales and other white scales irregularly distributed; abdomen generally black, with two pairs of narrow white dorsal bars in anterior third, with a light reddish brown dorsal bar near middle, and with two more pairs of white dorsal bars in posterior third, the first of these much broader than the second; epigynum with a pair of strongly chitinized circular areas occupying nearly entire plate, each with broad margin and containing an oval spot, with internal spermathecae invisible..... *C. opima*, (p. 145)
14. Not with combination of characters given above.....15
15. Carapace a rich dark brown, with a fairly broad white stripe from opposite PLE along margin to posterolateral corner; clypeus with a scanty white fringe; abdomen with dark grayish dorsum and many light colored scales and bristles, across middle is a narrow, poorly defined light colored band, in posterior half is a series of poorly defined alternate light and dark chevrons; epigynum with two circular areas of moderate size moderately remote from posterior margin, also with a pair of reniform spermathecae largely between the circular areas and posterior margin..... *C. modesta*, (p. 141)
15. Not with combination of characters given above.....16
16. (Taken from F. Cambridge's description) "Carapace brown, cephalic area black, with a broad pale band behind the posterior eyes and continued to the anterior margins on each side". "Abdomen rich brown or black, mottled, with a broad, anterior, pale band continuous in front and running obliquely along the sides: on the posterior half is a large transverse oval area cut out by a pale band, with a pair of pale spots in the center; the pale band broadens at the spinners, and bears one or more small black central spots". Epigynum with a pair of auriculoid whitish areas contiguous medially, and a pair of small oval spermathecae just behind the whitish areas..... *C. nigriventer*, (p. 143)
16. (Taken from F. Cambridge's description) Carapace brown with many white scales, also with a pale posterior central stripe and a broad pale marginal stripe on each side; abdomen brown and dull white, mottled, with a central pale dorsal stripe containing several pale chevrons in posterior half, also with four dorsal white spots set in brown patches; epigynum with a pair of somewhat oval areas contiguous medially and somewhat obliquely placed at some distance from posterior margin... *C. quadriguttata*, (p. 153)

Corythalia albicincta (F. Cambridge), 1901

Sidusa albicincta F. Cambridge, 1901
C. albicincta Simon, 1903
S. albicincta Banks, 1909
C. albicincta Petrunkevitch, 1911
C. albicincta Petrunkevitch, 1925

So far as I know, this species has not been taken in Panama since the original discovery recorded by F. Cambridge and it has not yet appeared in my collection.

Corythalia bicincta Petrunkevitch, 1925

C. bicincta Banks, 1929
C. sitticus Chamberlin and Ivie, 1936, female
Sidusa tulineba Chamberlin and Ivie, 1936, male

This well marked species appears to be quite common in regions where I have collected. I have it from the following localities: Canal Zone Biological Area, June–July, 1934; June–July, 1936; July–August, 1939; El Valle, R. P,. July, 1936; Porto Bello, R. P., August, 1936; Madden Dam region, C. Z., August 1936, 1939; Canal Zone Forest Reserve, July, 1939.

Corythalia bryantae spec. nov.

Figures 119–120

Male holotype. Total length 4.99 mm. Carapace 2.56 mm. long, 1.95 mm. wide opposite second coxae, 1.34 mm. tall and, therefore, slightly more than two thirds as tall as wide; PLE occupy seventy-three eighty-fifths of width of carapace at their level; of typical form for the genus; with numerous long black bristles around eyes and shorter bristles in interocular space and on posterior declivity, but none which seem to be especially significant; with a shallow median depression between posterior borders of PLE and with a short median longitudinal thoracic groove beginning at bottom of median depression.

Eyes. Viewed from in front, anterior row recurved so that a line tangent to dorsal borders of AME is also tangent to dorsal borders of ALE. Anterior row and posterior row almost exactly equal in width. Middle row shorter than others in ratio of 67 : 72. Quadrangle of laterals wider than long in ratio of 3 : 2. Total eye space occupies about eight fifteenths of length of carapace. Ratio of eyes AME : ALE:

PME : PLE = 22 : 13 : 4 : 12.5. AME separated from one another by three forty-fourths of the diameter of AME, from ALE by five forty-fourths of the diameter of AME. Middle eyes closer to PLE than to ALE in ratio of 5 : 7. Height of clypeus equal to five twenty-seconds of the diameter of AME. Clypeus decorated with a well developed fringe of white scales which extend laterally just beyond lateral borders of ALE; dorsal to the fringe white scales cover most of the surface and extend laterally to fill space beneath ALE; also three long stiff bristles in lower angle between AME, and two long whitish bristles beneath each AME together with a few long white hairs between AME and between AME and ALE.

Chelicerae. Essentially parallel, moderately robust, vertical, not produced but mildly excavated medially (obscured by rich growth of bristles and hair). Apparently in life with sparsely arranged white scale-like hair and simple hair over anterior surface. Basal segment .84 mm. long. Fang moderately robust, short, evenly curved. Fang groove with the usual soft promarginal ridge bearing a row of about ten to twelve stiff black bristles; at medial end of groove a fairly robust fissidentate promarginal tooth with two cusps; retromargin of groove with a single simple robust tooth (Fig. 120).

Maxillae. Parallel, longer than wide in middle in ratio of about 15 : 8, quite concave along outer border, considerably dilated distally, with outer distal corner drawn out to a distinct point but not to a hook, with well developed scopula along truncature and with long white lanceolate hairs in a diagonal band across retrolateral surface.

Lip. Wider than long in ratio of about 19 : 15, basal excavations reach a little more than one third of length, reaches not quite to middle of maxillae. Sternal suture gently procurved.

Sternum. Broadly scutiform, longer than wide in ratio of 9 : 7, widest between second coxae but nearly as wide between first coxae, mildly convex, very blunt and rounded at posterior end which is not extended between fourth coxae which are separated by one fifth of their width.

Legs. 4231. Tibial index of first leg 19, of fourth leg 18.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.54	.95	1.12	.96	.50	5.07
2.	1.60	.91	1.15	.96	.51	5.13
3.	1.60	.83	.96	1.15	.56	5.10
4.	1.66	.76	1.10	1.34	.62	5.48

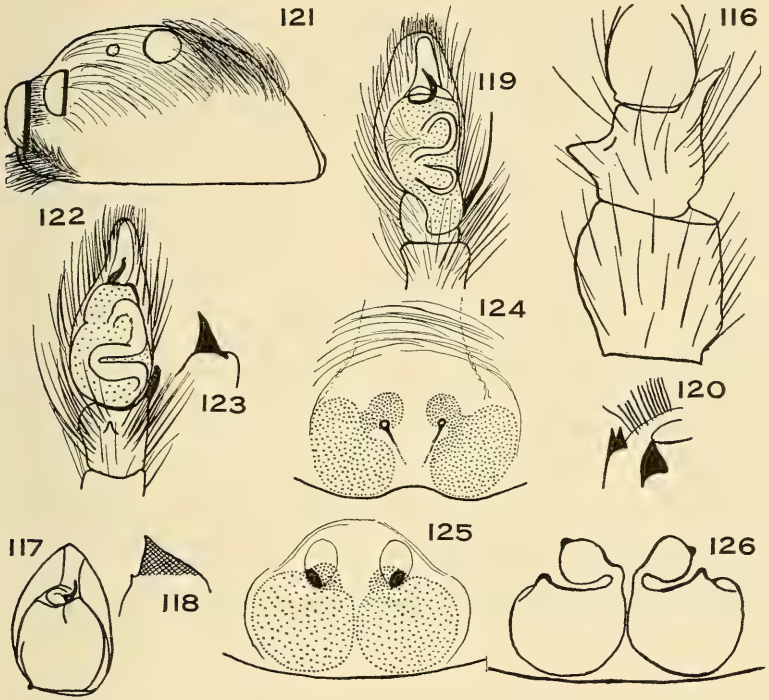
All but fourth legs with fringes. First leg: a light fringe on distal end of ventral surface of femur along retromargin; a heavy ventral fringe on tibia and metatarsus which extends over onto lateral surfaces to some extent and to distal end of patella. Second leg: essentially as in first with somewhat more of the femur involved. This leg: lightly fringed in same places as first and second. Fourth leg with no fringes. First and second tibiae and metatarsi somewhat flattened dorsally and prolaterally, also with considerable iridescence.

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral only distal 2, retrolateral only distal 1, ventral 0; patella only prolateral 0–1–0; tibia dorsal 0, prolateral 1–1–1, retrolateral 1–1, ventral 2–2 (offset)–2; metatarsus only prolateral and retrolateral 1–1, ventral 2–2. Second leg: femur and patella like first except femur retrolateral distal 2; tibia and metatarsus as in first. Third leg: femur and patella as in first except patella retrolateral 0–1–0; tibia dorsal 1–0–0, prolateral and retrolateral 1–1–1, ventral 1p-0–2; metatarsus dorsal 0, prolateral 1–2, retrolateral 2–2, ventral 2–2. Fourth leg: as in third except metatarsus prolateral 1–1–2, retrolateral 2–1–2, ventral 2–2. No palpal spines.

Palp. Femur with a prominent dorsal crest of long white hair; somewhat twisted on its long axis. Patella and tibia both short with the former longer than latter in ratio of 3 : 2, patella covered with white scale-like hairs dorsally; tibial retrolateral apophysis a long attenuated filament. Tarsus with a considerably swollen bulb and a lobe overlapping tibia; embolus makes about one full turn of a spiral but the latter is hidden because the circular part is in a plane at right angle to the long axis and is crowded at the anterior end and somewhat obscured by anterior margin of bulb; terminal part of embolus is stout but it ends in a very slender point (Fig. 119).

Abdomen. Ovoid, longer than wide in ratio of about 20 : 13, widest in middle, anal tubercle a short flattened cone, all spinnerets nearly equal in length, with posterior pair spread apart so the middle pair is plainly in view dorsally, anterior pair most robust and contiguous. Position of colulus uncertain. Tracheal spiracle a short distance from base of spinnerets.

Color in alcohol. Chelicerae a rich reddish brown sparsely covered with loose white scales; maxillae the same with yellowish white along medial edges and truncature and grayish streaks elsewhere; lip much the same, margined with yellowish white and somewhat streaked with gray. Sternum dark brown with coxae the same ventrally, together with many white scales. Legs: dark brown, almost black ventrally,



External Anatomy of Spiders

Figs. 116–118. *Compsodecta montana* Chickering; male palp, ventral view; palpal tarsus, ventral view; palpal tibial retrolateral apophysis, retrolateral view.

Fig. 119. *Corythalia bryantae* Chickering; male palp ventral view.

Fig. 120. *C. bryantae* Chickering; male cheliceral teeth.

Fig. 121. *Corythalia canalis*, male carapace, lateral view.

Figs. 122–123. *C. canalis*, male palp, ventral view; palpal tibial apophysis, retrolateral view.

Fig. 124. *C. canalis*, epigynum, ventral view.

Figs. 125–126. *Corythalia clara*, epigynum, ventral view; dissected, viewed from within, from paratype.

somewhat lighter dorsally especially the patellae and third and fourth tarsi; all with many whitish scales which together with the black hair gives a grayish appearance to segments which retain the scales; scales especially numerous on third and fourth coxae dorsally and in middle of dorsal surface of third and fourth femora. Carapace: in addition to colors on clypeus already noted, a sprinkling of white scales occurs from ALE around PME beneath PLE; also a sprinkling of white scales on the space from PLE to posterior declivity (probably in life this whole area is covered with the loose white scales); a narrow white stripe extends along just above ventral margin from opposite interval between first and second coxae to posterolateral corner; eyes on black spots; elsewhere dark reddish brown with many black streaks. Abdomen: a black spot covers base and extends laterally where there are short broken narrow yellowish and dark brown stripes; just posterior to black basal spot is a white band nearly divided in middle; remainder of dorsum covered with light yellow scales overlying a black and yellowish finely dotted and streaked background; just behind middle of dorsum is a faintly outlined light colored narrow band bounded in front and behind by two small, nearly black irregular spots not far from lateral margin; also several faintly outlined alternate yellowish and brown chevrons; venter with a broad, nearly black, central stripe bounded laterally by a row of yellowish dots and containing within it two less clearly outlined rows of similar dots.

Type locality. Male holotype and one male paratype from Boquete, R. P., July, 1939.

Corythalia canalis (Chamberlin), 1925

Figures 121–124

Saitis canalis Chamberlin, 1925
C. canalis Banks, 1929

It is not at all clear where this species belongs in the Phiale Group. There are good reasons why it should not be regarded as a Saitis, and some reasons why it may not be well to place it in the genus Corythalia. The fringes on its legs, the palpal and epigynal characters all seem to make it quite different from typical members of the genus. In view of the uncertainty concerning its proper position I have deemed it wise to leave it where it was placed by Mr. Banks. The fact that the species has never been described in detail, and also because I have the allotype female seems to warrant a careful description of both sexes.

Male hypotype. Total length 3.90 mm. Carapace 2.05 mm. long, 1.54 mm. wide at level of posterior eyes which occupy sixty-one sixty-eighths of width of carapace at that level; carapace appears to be wider than it actually is due to the presence of the fluffy hairs at the sides in cheek region; gently convex in interocular area, rises rather steeply dorsal to AME and then remains nearly level with a gentle arch to beginning of posterior declivity (Fig. 121); 1.02 mm. tall and, therefore, about two thirds as tall as wide, no tufts of hair in ocular area but hair beneath lateral eyes recurved and erect; a short median longitudinal thoracic groove beginning about opposite posterior borders of PLE.

Eyes. Anterior row recurved so that a straight line from dorsal borders of AME cuts off about the dorsal third of ALE. Anterior row wider than posterior row in ratio of 33 : 31. Middle row almost as wide as posterior row. Quadrangle of laterals wider than long in ratio of 33 : 20. Total eye space occupies twelve twenty-thirds of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 20 : 12.5 : 4 : 12. AME separated from one another by three fortieths of their diameter, from ALE by one eighth of their diameter. Middle eyes closer to PLE than to ALE in ratio of 2 : 3. Height of clypeus equal to about half the diameter of AME (hidden by thick coating of hair). Clypeus decorated with a heavy coat of long yellowish white hair generally turned toward the center line but also overhanging chelicerae. Iridescent scales in upper angle of AME and beneath ALE are azure in certain light; in addition to three stiff bristles in lower angle between AME there are also on each side two more stiff bristles below AME converging toward the middle.

Chelicerae. Vertical, parallel, not produced, of moderate size, tapered at distal end, with whole prolateral surface covered by long bristles which are richly greenish iridescent; fang moderately slender, evenly curved. Fang groove with a row of stiff black hairs and two small teeth on promargin; a single slender retromarginal tooth (observed and drawn from paratype to avoid injury to hypotype).

Maxillae. Somewhat convergent, longer than wide in middle in ratio of about 5 : 3, considerably dilated distally and drawn out into a blunt tubercle at outer distal angle, with well developed scopula along truncature.

Lip. Wider at base than long in ratio of about 5 : 4, nearly triangular in shape, with basal excavations extending nearly half its length, reaches just beyond middle of maxillae. Sternal suture straight.

Sternum. Broadly scutiform, longer than wide in ratio of about 8 : 7, widest between second coxae, a little wider than base of lip at

anterior margin, blunt posterior end not extended between fourth coxae which are separated by one seventh of their diameter.

Legs. 3412. Tibial index of first and fourth legs 18.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.06	.62	.70	.70	.44	3.52
2.	.98	.57	.58	.66	.38	3.17
3.	1.28	.60	.78	.96	.41	4.03
4.	1.12	.50	.72	1.06	.45	3.85
Palp	.64	.33	.18	—	.51	1.66

First leg with a dorsal femoral fringe, proximal half with dark hair and distal half with whitish hair; distal half of prolateral surface with long spatulate hairs which are brilliantly greenish iridescent; patella and tibia also with iridescent hairs on prolateral surface and with ventral black fringe extended onto metatarsus. Second leg much like first. Third and fourth legs with considerable iridescence but not with fringes except poorly developed on third femora.

Spines. First leg: femur only dorsal 0–0–1–1–1 and prolateral distal 2; patella only prolateral 0–1–0; tibia only prolateral 0–0–1, ventral 2–2(staggered)–2; metatarsus only prolateral 1–1; retrolateral 0–1, ventral 2–2. Second leg: femur and patella as in first except retrolateral distal 1; tibia as in first except prolateral 0–1–1; metatarsus as in first except retrolateral 1–1. Third leg: femur and patella as in second except patella retrolateral 0–1–0; tibia dorsal 1–0–0, prolateral and retrolateral 0–1–1, ventral 0–1p–2; metatarsus dorsal 1r–1r, prolateral 1–2, retrolateral 1–1, ventral 2–2. Fourth leg: femur and patella as in third except femur prolateral 0; tibia as in third; metatarsus dorsal 1p–1p, prolateral and retrolateral 1–1, ventral 2–2. Palpus: no spines observed, may be hidden by crests.

Palp. Femur with a scanty whitish ventral fringe on proximal half, and a dorsal fringe along whole surface with light hairs except near distal end where there are some black ones; patella with a dorsal fringe of short, highly iridescent scales which in certain light are azure and in other light greenish; greenish iridescent scales continue dorsally along tibia and tarsus. Patella nearly twice as long as tibia; tarsus longer than patella in ratio of about 3 : 2. Retrolateral tibial apophysis a simple spur, broad at base and tapered to a point; also a soft, poorly chitinized, midventral tubercle. Tarsus with a bulb which shows a very prominent tubular loop; embolus is a short black spine with a genu about one third from base (Figs. 122–123).

Abdomen. Distinctly ovoid, longer than wide in ratio of 3 : 2, widest in middle; anal tubercle a short flattened cone; spinnerets slender, anterior pair most robust, middle and posterior pairs equally slender, posterior pair spread apart so that middle pair are exposed to view. Position of colulus marked by a cluster of black bristles. Tracheal spiracle near base of spinnerets.

Color in alcohol. Legs generally dark brown, tarsi and patellae, lighter, iridescence as already noted. Carapace: clypeus yellowish white from the long hair present there; from ALE a broad yellowish white stripe much above and below PME and PLE extends back just behind PLE and then becomes a broad band across the beginning of posterior declivity; elsewhere dark brown, more or less streaked with black although in life interocular region probably has some of the yellowish white hairs and iridescent scales. Abdomen: a fairly broad, central, yellowish white stripe from base nearly to anal tubercle includes several light and dark chevrons in its posterior half; elsewhere dorsally, dorsolaterally, and ventrally brown, more or less spotted and mottled laterally.

Female allotype. Total length 4.22 mm. Carapace 1.98 mm. long, 1.41 mm. wide opposite posterior eyes. Except for the lack of the copious supply of hair carapace is essentially like that of male.

Eyes. Height of clypeus equal to about one third of diameter of AME. Clypeus without the thick coating of yellowish white hair so characteristic of male; fringed with bristles along ventral border. Otherwise essentially as in male.

Chelicerae. Essentially as in male.

Maxillae, Lip, and *Sternum.* Essentially as in male except outer distal angle of maxillae without tubercles, smoothly rounded.

Legs. 3412. Tibial index of first leg 24, of fourth leg 18.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.96	.46	.64	.57	.33	2.96
2.	.89	.51	.57	.51	.32	2.80
3.	1.22	.62	.67	.86	.33	3.70
4.	1.08	.48	.71	.93	.38	3.58

No fringes on legs but numerous highly iridescent scales. Patella and tibia of palp especially well supplied with these scales.

Spines. First leg: femur, patella and tibia as in male except femur prolateral distal 1; metatarsus only prolateral 1–0, ventral 2–2. Second leg: femur, patella, and metatarsus as in male, tibia as in first leg of male. Third leg: as in male. Fourth leg: as in male except metatarsus dorsal 1r–1r–0–1r, prolateral and retrolateral 1–1, ventral 1p–1p.

Abdomen. Essentially as in male.

Epigynum. There are two large reniform spermathecae at outer posterior corners of the epigynal plate; two small depressions, possibly openings, near center associated with obscure tubules within (Fig. 124).

Color in alcohol. Legs yellowish except fourth femur which is dark brown, almost black, on prolateral and retrolateral surfaces of proximal half; chelicerae reddish brown; palps yellowish with many highly iridescent scales. Carapace without most of the special decorations so prominent in male; interocular area very dark brown; region covered by yellowish hair in male is, in the female, provided with very iridescent scales which in certain light are light bluish (probably in life these scales are spread over the interocular area); elsewhere brown. Abdomen: essentially as in male; venter with a large irregular yellowish spot behind genital groove.

Type locality. Male hypotype and female allotype from Ft. Sherman, C. Z., August, 1939. Two other males from Ft. Davis, C. Z., Aug., 1936, and Ft. Sherman, Aug., 1939. Several female paratypes from Ft. Sherman, Aug., 1939 and Ft. Randolph, C. Z., Aug., 1936.

Corythalia clara Chamberlin and Ivie, 1936

Figures 125–126

This species has been collected at the following localities: Canal Zone Biological Area, June–July, 1934; July–August, 1939; Porto Bello, R. P., Aug., 1936; Balboa, C. Z., Aug., 1936; C. Z. Forest Reserve, C. Z., Aug., 1939. Dr. Ivie's figure of the dorsal aspect of the animal is a very good drawing, but his figure of the epigynum omits some important features, perhaps because it was made from an immature specimen. For this reason I have drawn a figure in which I have tried to show all of the essential features which are seen in a mature specimen.

Corythalia conspecta (Peckham), 1896

Escambia conspecta Peckham, 1896
Sidusa conspecta F. Cambridge, 1901
C. conspecta Simon, 1903
E. conspecta Peckham, 1909
C. conspecta Petrunkevitch, 1911
C. conspecta Banks, 1929
C. diffusa Chamberlin and Ivie, 1936

Banks had a male from the Canal Zone Biological Area, Aug., 1924. I have several females, July, 1934 and 1936, and a male, July, 1939, all from the same locality. Female types are available for study from the Peckham collection in the Museum of Comparative Zoölogy, but the males have, unfortunately, disappeared. Either Mr. Banks' male or mine should be described as the hypotype as there are several important features not mentioned in the original description.

Corythalia modesta spec. nov.

Figures 127–129

Female holotype. Total length 3.90 mm. Carapace 1.98 mm. long, 1.41 mm. wide between PME and PLE which occupy fifteen sixteenths of width of carapace at their level; dorsally carapace rises gently from AME and reaches highest point just in front of PLE and then arches evenly over to beginning of steep posterior declivity which covers only about one eighth of length of carapace; 1.02 mm. tall and, therefore, about five sevenths as tall as wide; with numerous short and long bristles but none which seems to be especially noteworthy; a short longitudinal median thoracic groove beginning at the transverse depression which is a short distance behind posterior border of PLE.

Eyes. Anterior row recurved so that dorsal borders of ALE are slightly above those of AME. Anterior row wider than posterior row in ratio of 63 : 60. Middle row shorter than posterior row in ratio of 57 : 60. Quadrangle of laterals wider than long in ratio of about 3 : 2. Total eye space occupies slightly more than half the length of carapace. Ratio of eyes AME : ALE : PME : PLE = 19 : 12 : 2.5 : 10. AME separated from one another by slightly less than one nineteenth of their diameter, from ALE by twice as far. Middle eyes closer to PLE than to ALE in ratio of 3 : 4. Height of clypeus equal to about one third of diameter of AME. Clypeus decorated only with a scanty fringe of white scale-like hairs along ventral margin, and three long

upturned bristles in lower angle between AME. All eyes of anterior row surrounded by a scanty fringe of white hairs like those on clypeus.

Chelicerae. Vertical, essentially parallel, moderately robust, somewhat full and rounded in front; basal segment .53 mm. long; truncated coniform; front surface with a moderate number of weak bristles. Fang moderately stout, short, evenly curved. Fang groove with a soft promarginal ridge bearing a row of eight or nine short stiff black bristles and at medial end is a fairly robust tooth with two cusps which might be considered as two contiguous teeth; retromargin with a simple single tooth of moderate size (Fig. 127).

Maxillae. Somewhat convergent, longer than wide in middle in ratio of about 3 : 2, moderately concave along outer border, palp inserted into basal half, moderately dilated distally, outer distal angle very gradually rounded, fairly well developed scopula along truncature.

Lip. Wider than long in ratio of about 5 :4, basal excavations reach about one third of length, almost triangular from level of excavations, distal end only one fourth as wide as base. Sternal suture straight.

Sternum. Almost oval, longer than wide in ratio of 17 : 14. moderately convex, widest between second coxae but nearly as wide between first coxae, posterior end very blunt and not extended between fourth coxae which are separated by only about one seventh of their diameter.

Legs. 4312. Tibial index of first leg 22, of fourth leg 20.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.09	.51	.65	.58	.39	3.22
2.	1.02	.45	.58	.51	.33	2.89
3.	1.07	.59	.70	.77	.40	3.53
4.	1.15	.56	.77	.95	.45	3.88

Legs somewhat hairy but with no fringes.

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral distal 1; patella prolateral and retrolateral 0–1–0; tibia only prolateral 0–0–1, ventral 2–2(staggered)–2; metatarsus only prolateral 1–1, ventral 2–2. Second leg: femur and patella as in first except patella retrolateral 0; tibia only prolateral 0–1–1–0, ventral 1r–2–2; metatarsus as in first except retrolateral 0–1. Third leg: femur dorsal 0–0–1–1–1, prolateral distal 2, retrolateral distal 1; patella as in first; tibia dorsal 1–0–0, prolateral and retrolateral 1–1, ventral 1p(very long)–0–2; metatarsus only prolateral and retrolateral 1–2, ventral 2–2. Fourth leg: femur only dorsal 0–0–1–1–1 and retrolateral distal 1; patella as in first;

tibia dorsal 0, elsewhere as in third; metatarsus prolateral and retrolateral 1–1–2, ventral 1p–1p.

Abdomen. Broadly ovoid, longer than wide in ratio of 4 : 3, widest in middle; anal tubercle a short broad flattened cone somewhat retracted; all spinnerets short and nearly equal in length, posterior pair spread far apart so that middle pair is well exposed to view. Position of colulus indicated by minute tuft of bristles. Tracheal spiracle near base of spinnerets.

Epigynum. Follows typical pattern for Corythalia; two small circular areas in contact medially and situated a little more than one third of their diameter from posterior border; small openings near center of epigynum on medial side of the circular areas may be opposite or staggered as in holotype; two fairly large bean-shaped spermathecae mainly between posterior margin and the circular areas. Dissection of the epigynum of a paratype reveals that the spermathecae are actually as they appear externally to be (Figs. 128–129).

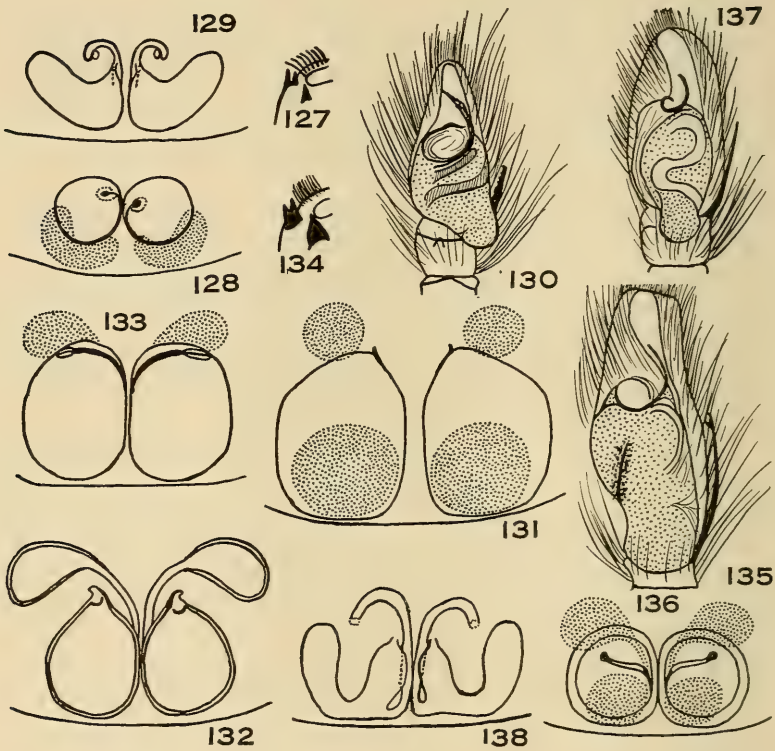
Color in alcohol. Palp: proximal half of femur gray, distal half and patella yellowish white; tibia and tarsus reddish brown except yellowish white tip of latter. Chelicerae a rich reddish brown, except yellowish white in vicinity of fang groove. Legs generally reddish brown with femora grayish brown, lighter beneath. Carapace a rich dark brown, nearly black around eyes; a fairly broad white stripe from opposite PLE along ventral margin on each side to posterolateral corner; clypeus as already noted. Abdomen: dorsum very dark gray with much black simple recumbent hair, many light colored scales and bristles; across the middle is a narrow, poorly defined, light colored band; in posterior half is a series of poorly defined alternate light and dark chevrons; the venter shows three dark stripes narrowed posteriorly and bounded by four rows of yellowish dots; laterally there are oblique narrow broken alternate dark and yellowish stripes.

Type locality. Female holotype and five female paratypes from Boquete, R. P., July, 1939.

Corythalia nigriventer (F. Cambridge), 1901

Sidusa nigriventer F. Cambridge, 1901
C. nigriventer Simon, 1903
C. nigriventer Petrunkevitch, 1911
C. nigriventer Petrunkevitch, 1925

F. Cambridge had both sexes of this species from Panama. So far as known it has not been reported since his time, and it has not yet appeared in my collection.



External Anatomy of Spiders

Fig. 127. *Corythalia modesta* Chickering; female cheliceral teeth.
Figs. 128–129. *C. modesta* Chickering; epigynum, ventral view, and dissected, viewed from within.
Fig. 130. *Corythalia obsoleta*, male palp, ventral view.
Figs. 131–132. *C. obsoleta*, epigynum, ventral view, and dissected, viewed from within.
Fig. 133. *Corythalia panamana*, epigynum, ventral view.
Fig. 134. *Corythalia parvula*, male cheliceral teeth.
Fig. 135. *C. parvula*, male palp, ventral view.
Fig. 136. *C. parvula*, epigynum, ventral view.
Fig. 137. *Corythalia pulchra*, male palp, ventral view.
Fig. 138. *C. pulchra*, epigynum, dissected and viewed from within.

Corythalia obsoleta Banks, 1929

Figures 130–132

C. endigma Chamberlin and Ivie, 1936

This species is in my collection from the following localities: Canal Zone Biological Area, June–July, 1934; June–July, 1936; June–July, 1939; Ft. Davis, C. Z., Aug., 1936; Porto Bello, R. P., Aug., 1936; C. Z. Forest Reserve, C. Z., July, 1939. The male has heavy fringes on third leg and less well developed fringes on second and first; the female has no fringes on her legs. Ventral tibial spines on first leg of male 1r–2(staggered)–2, in female they are apparently variable. A dorsal proximal tibial spine on third and fourth legs, sometimes lacking. The embolus of the male palp is not only stout, as pointed out by Banks, but it is also grooved and has a distinct widening near tip (Fig. 130). The epigynum has been studied carefully both externally and internally by dissection (Figs. 131–132). Chamberlin and Ivie list *C. endigma* as a new species on page five of their paper ('36), and their Fig. 42 shows the general features of the epigynum, but I can find no text to accompany the figure. I believe, however, that *C. endigma* C. and I. is a synonym for *C. obsoleta* Banks.

Corythalia opima (Peckham), 1885

Jotus opimus Peckham, 1885
Dynamius opimus Peckham, 1896
D. opimus Banks, 1898
Sidusa fulvoguttata F. Cambridge, 1901
S. opima F. Cambridge, 1901
C. opima Simon, 1903
S. opima Banks, 1909
S. fulvoguttata Banks, 1909
C. opima Peckham, 1909
C. opima Petrunkevitch, 1911

I have one female from El Valle, R. P., July, 1936, which evidently belongs to this species.

Corythalia panamana Petrunkevitch, 1925

Figure 133

C. panamana Banks, 1929

Professor Petrunkevitch had only the male. Mr. Banks had both sexes from Bella Vista, R. P., near Panama City, July–Aug., 1924.

It seems rather curious that I have not taken this species in any of my collecting trips in Panama but such is the case, however. I have carefully checked through the original description with the specimens collected and identified by Mr. Banks before me. Certain differences exist between the specimens and the written description but perhaps they are not significant. If these specimens belong to *C. panamana* then Mr. Banks' female should be described as the allotype. The male palp has the following features: a small dorsal cap of white hair at distal end of femur and proximal end of patella; tibia about seven elevenths as long as patella; tibial apophysis stout, blunt at distal end where there are three coarse serrations; tarsus robust, with embolus completing one full turn or a little more. The epigynum is of the *C. obsoleta* type with each half considerably longer than wide; two spermathecae a diameter of one of them apart and largely anterior to epigynal plate (Fig. 133). Both sexes have a broad white stripe on each side of the carapace from opposite PME to posterolateral corner. The female has some white around anterior row of eyes and the male has the same region with reddish hair. In both sexes there is a rather broad, central, abdominal, dorsal, light colored band separating two darker bands. The male is a little less than six mm. long; the female almost eight mm. long. The third leg in males is heavily fringed; second and first progressively less heavily fringed.

Corythalia parvula (Peckham), 1896

Figures 134–136

Escambia parvula Peckham, 1896
Sidusa parvula F. Cambridge, 1901
S. lutea F. Cambridge, 1901
C. parvula Simon, 1903
C. lutea Simon, 1903
C. parvula Petrunkevitch, 1911
C. lutea Petrunkevitch, 1911

The Peckhams had this species from Guatemala and Mexico. I have had the opportunity to examine the types carefully. There are also two specimens in the Nathan Banks collection from Costa Rica which are labelled this species, but they are very clearly not this species and belong to a different section of the genus. F. Cambridge ('01) in connection with his brief remarks about *S. lutea* wrote as follows: "Had Peckham made any mention of orange scales on the clypeus one would have suspected that this species was his *S. parvula* for

in the figure the tibial spur is very clearly bifurcate". I think there is no reasonable doubt of the synonymy as I have given it above. It would seem that a species with such clearly marked features and yet one which has given rise to confusion in the minds of good workers should be carefully described in accord with our modern methods. I have both males and females from Porto Bello, R. P., and from these I have selected hypotypes as follows:

Male hypotype. Total length 4.80 mm. Carapace 2.37 mm. long, 1.79 mm. wide opposite second coxae and a little behind PLE which occupy eleven twelfths of width of carapace at that level; a shallow depression at anterior end of the short longitudinal median thoracic groove which begins just opposite the posterior border of PLE; no cephalic tufts of hair but numerous stiff bristles around all eyes and to some extent within interocular area; 1.28 mm. tall and, therefore, a little more than two thirds as tall as wide; rises gently from AME to highest point opposite PLE and then descends very gently for nearly three fourths of distance to posterior border where steep declivity begins and which descends abruptly to posterior border.

Eyes. Anterior row recurved so that a straight line from dorsal borders of AME cuts off about one fourth of diameter of ALE. Anterior row and posterior row almost equal in width, middle row shorter than others in ratio of 59 : 65. Quadrangle of laterals wider than long in ratio of 65 : 42. Total eye space occupies thirty-three seventieths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 19.5: 12 : 3 : 11. AME separated from one another by four thirty-ninths of their diameter, from ALE by six thirty-ninths of their diameter. Middle eyes closer to PLE than to ALE in ratio of 10 : 13. Height of clypeus equal to a little less than one third of the diameter of AME. Clypeus decorated with a thick coat of dull orange colored scales which spread around AME, between AME and ALE and also in a conspicuous band between ALE; also seven long stiff bristles in two rows, five above and two below.

Chelicerae. Moderately robust, vertical, parallel, somewhat flattened in front, somewhat iridescent, irregularly rugulose, with no boss visible, sparsely covered with long, somewhat converging, weak bristles. Fang moderately robust, evenly curved. Fang groove with a row of stiff black promarginal bristles close to base of fang, and a single bidentate tooth near medial end of groove on promargin; on retromargin is a single, simple, fairly robust tooth (Fig. 134).

Maxillae. Parallel, longer than wide in ratio of 7 : 4, considerably dilated distally, moderately concave along outer border, outer distal

angle somewhat acute but not drawn out into a tubercle or hook, with well developed scopula along truncature and along medial edge for a distance.

Lip. Wider at base than long in ratio of 17 : 15, gradually narrowed from distal ends of basal excavations which reach one third of its length, reaches a little beyond middle of maxillae. Sternal suture straight.

Sternum. Broadly scutiform, longer than wide in ratio of 43 : 36, lateral sides well rounded, anterior border just a little wider than lip, posterior end very blunt and not extended between fourth coxae which are separated by only one ninth of the diameter.

Legs. 4321. Tibial index of first leg 20, of fourth leg 18.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.30	.75	1.00	.88	.51	4.44
2.	1.47	.77	1.05	.90	.52	4.71
3.	1.53	.77	1.02	1.15	.58	5.05
4.	1.52	.71	1.10	1.28	.64	5.25
Palp	.63	.27	.18	—	.82	1.90

Only first two pairs of legs with definite fringes. First leg: poorly developed fringes along promargin and retromargin of ventral side of femur; ventral fringe along retromargin of tibia and metatarsus; dorsal fringe along retromargin of tibia and metatarsus; all black except a few white femoral hairs; tibia mildly flattened on promargin of dorsal side. Second leg: essentially like the first except more white scale-like hairs occur on prolateral sides of femur and patella. No fringes on third and fourth legs. More or less iridescence from presence of scales or modified surface on all legs. All coxae with white scale-like hairs, especially third and fourth on dorsal sides.

Spines. First leg: femur only dorsal 0–0–1–1–1, prolateral and retrolateral 0–0–0–0–2 (on right leg only one distal lateral on both sides); patella only prolateral 0–1–1 and retrolateral 0–1–0; tibia only prolateral 1–1–1, retrolateral 1–0, ventral 2–2–2; metatarsus dorsal 0–0–2, prolateral 1–1, retrolateral 1–1–1, ventral 2–2. Second leg: femur and patella as in first except femur dorsal 0–0–0–1–2; tibia as in first; metatarsus dorsal 0–0–2, prolateral 1–1, retrolateral 1–1, ventral 2–2. Third leg: femur and patella as in second except prolateral 0–0–0–1–2 on femur; tibia dorsal 1–0–0, prolateral and retrolateral 1–1–1, ventral 2–0–2; metatarsus dorsal 2–2, prolateral 0–1, retrolateral 1–1, ventral

0–2–2. Fourth leg: femur and patella as in first; tibia as in third except ventral 2–2–2; metatarsus dorsal 1–1, prolateral 1–2, retrolateral 1–1–2, ventral 0–2–2. No spines observed on palpus.

Palp. Femur nearly straight, with a mildly developed dorsal crest of white hairs at distal half which spreads dorsally over patella; both patella and tibia short but patella longer than tibial body in ratio of 3 : 2; tarsus nearly as long as tibia and patella together. Tibial retrolateral apophysis long, slender, bifurcate at tip. Embolus slender and with about one and one third turns of a spiral (Fig. 135).

Abdomen. Ovoid, longer than wide in ratio of about 14 : 9, widest near middle; anal tubercle a short flattened cone; anterior pair of spinnerets most robust, others slender and with posterior pair spread widely apart thus exposing middle pair plainly to view, all of moderate length; colulus represented by a small tuft of black bristles; tracheal spiracle near base of spinnerets.

Color in alcohol. All legs generally dark brown, progressively somewhat lighter from femora to tarsi; numerous white scale-like hairs especially on second femora and patellae and on third and fourth coxae as already noted. Palps generally dark brown or black with white scales and hair as already noted. Chelicerae very dark brown in front, lighter behind and near fang groove; lip and maxillae brownish with yellowish tips. Carapace generally very dark, almost black in ocular region, streaked along lateral sides; a narrow white boundary on each side along ventral margin from opposite PLE to posterolateral corner. Clypeus a dull orange as noted; also a band of the same between ALE just dorsal to AME. Sternum brownish. Abdomen: dark brown or black at base and this extends laterally to posterior end; a cap of yellowish scale-like hairs covers anterior quarter of dorsum; behind the cap abdomen is dark brown with a pair of dorsolateral yellowish diagonal bars and still farther back another pair of smaller yellowish dorsolateral spots; venter dark brown with four rows of yellowish dots.

Female hypotype. Total length 4.67 mm. Carapace 2.11 mm. long, 1.47 mm. wide, 1.00 mm. tall. Otherwise essentially as in male.

Eyes. Anterior row much less recurved than in male, dorsal borders of ALE and AME nearly on a level. Total eye space occupies nearly one half the length of carapace. Ratio of eyes AME : ALE : PME : PLE = 18 : 11: 2.5 : 10. Clypeus and ocular region without the orange scale-like hairs so characteristic of male.

Chelicerae. Moderately robust, vertical, parallel, somewhat swollen in front and somewhat tapered distally. Fang and fang groove essentially as in male.

Maxillae, Lip, and *Sternum.* Essentially as in male except posterior coxae are much farther apart than in that sex.

Legs. 4321. Tibial index of first leg 23, of fourth leg 19.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
		(All measurements in millimeters)				
1.	.96	.62	.65	.58	.40	3.21
2.	1.02	.58	.64	.58	.40	3.22
3.	1.21	.64	.71	.86	.40	3.82
4.	1.21	.62	.88	1.00	.44	4.15

No definite fringes on any legs; with little iridescence.

Spines. First leg: femur as in male except prolateral 0–0–0–0–1; patella as in male except retrolateral 0; tibia only prolateral 1–1, ventral 2–2–2; metatarsus only prolateral and retrolateral 1–1, ventral 2–2. Second leg: femur as in male; elsewhere as in first leg. Third leg: femur and patella as in first leg of male; tibia as in male except ventral 1p–0–2; metatarsus dorsal 2–0, prolateral and retrolateral 1–2, ventral 2–2. Fourth leg: femur and patella as in first leg of male; tibia dorsal 1–2, prolateral and retrolateral 1–1–1, ventral 1p–0–2; metatarsus dorsal 1r–0–0, prolateral and retrolateral 1–1–2, ventral 1p–2.

Abdomen. Essentially as in male.

Epigynum. With two nearly circular areas touching medially, only a short distance from genital furrow; with a pair of somewhat oval spermathecae near posterior margin of plate and a second pair of pyriform spermathecae largely in front of plate and wide apart (Fig. 136).

Color in alcohol. Essentially as in male except for the decorations on the clypeus and around eyes and the dorsal bar between ALE all of which are entirely lacking in the female.

Type locality. Male and female hypotypes from Porto Bello, R. P., Aug., 1936. Two additional males and two females taken with hypotypes.

Corythalia pulchra Petrunkevitch, 1925

Figures 137–138

Male allotype. Total length 5.50 mm. Carapace 2.82 mm. long, 2.11 mm. wide opposite second coxae, 1.47 mm. tall and, therefore, almost seven tenths as tall as wide. PLE occupy about seven eighths of width of carapace at their level. Carapace considerably depressed in a recurved arc just posterior to PLE; with a short distinct median longitudinal thoracic groove beginning at a line tangent to posterior borders

of PLE; with much black procumbent hair and white scales distributed as later described; also long black bristles in eye region but with no special tufts of hair.

Eyes. Viewed from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one eighth of diameter of ALE. Anterior row wider than posterior row in ratio of about 75 : 73. Middle row narrower than posterior row in ratio of 71 : 73. Quadrangle of laterals wider than long in ratio of about 3 : 2. Total eye space occupies seven seventeenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 23 : 14.5 : 4 : 13. AME separated from one another by five forty-sixths of their diameter, from ALE by slightly more. Middle eyes closer to PLE than to ALE in ratio of 11 : 15. Height of clypeus equal to thirteen twenty-thirds of diameter of AME. Clypeus decorated with a fringe of very loose white scales along ventral border; also on the ventral border is a row of bristles; three long stiff bristles in lower angle between AME and two more beneath each AME; white ventral fringe extends laterally as far as first coxae.

Chelicerae. Moderately robust, vertical, parallel, not produced, front surface covered with light colored bristles and sparsely by loose white scales, and black bristles near fang groove. Basal segment .82 mm. long. Fang short, fairly robust, evenly curved. Fang groove as usual with a soft promarginal ridge bearing a row of stiff black bristles; near medial end of promargin is a single simple small tooth; retromargin with a single simple small slender tooth.

Maxillae. Slightly convergent, longer than wide in ratio of about 2 : 1. moderately concave along outer border, moderately dilated distally, outer distal corner very gradually rounded and with a blunt point, with a well developed scopula along truncature.

Lip. Only slightly wider than long, basal excavations reach a little more than one third of length of organ, nearly triangular from distal ends of excavations, reaches three fifths of length of maxillae. Sternal suture slightly procurved.

Sternum. Generally scutiform, longer than wide in ratio of about 4 : 3, nearly as wide at anterior border as base of lip; lateral margins with three angles on each side corresponding to intercoxal intervals; posterior end truncated and with two small angles, not extended between fourth coxae which are separated by about one eighth of their width; with a few stiff bristles over entire surface.

Legs. 3421. Tibial index of first leg 24, of fourth leg 17.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.60	.89	.96	.83	.56	4.84
2.	1.73	.89	1.02	.90	.52	5.06
3.	2.05	1.03	1.44	1.44	.64	6.60
4.	1.92	.88	1.22	1.53	.70	6.25
Palp	.71	.27	.22	—	.80	2.00

All but fourth legs conspicuously fringed with black hair. First leg: only lightly fringed dorsally on femur, patella, tibia, and metatarsus, most along retromargin; ventrally fringed from femur to metatarsus, mostly along promargin; with much purplish iridescence; segments not flattened. Second leg: like the first except somewhat more heavily fringed and tibia is slightly flattened dorsally. Third leg: most heavily fringed of all; in addition to black fringe distributed essentially as in first and second there is a patch of white scale-like hair near distal end of femur on prolateral side; tibia strongly flattened prolaterally and dorsally thus making a conspicuous spinigerous ridge; metatarsus somewhat flattened like tibia. No fringes on fourth leg.

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral and retrolateral distal 2; patella only prolateral 0–1–0; tibia only prolateral 1–1–1, retrolateral 1–1–0, ventral 2–2–2; metatarsus only prolateral and retrolateral 1–1, ventral 2–2. Second leg: femur and patella as in first except patella retrolateral 0–1–0; tibia only prolateral 1–1–1, retrolateral 1–1(offset)–1, ventral 1r–2–2; metatarsus prolateral 1–2, retrolateral 1–1, ventral 2–2. Third leg: femur and patella as in second; tibia dorsal 1–0–0, prolateral and retrolateral 1–1–1, ventral 1p–1p–2; metatarsus only prolateral and retrolateral 1–2, ventral 2–2. Fourth leg: femur, patella, and tibia as in third except tibia ventral 1p–0–2; metatarsus only prolateral and retrolateral 1–1–2, ventral 2–2. No spines observed on palp.

Palp. Femur with a white crest over distal half of dorsal side and a row of white bristles diagonally across prolateral side in distal half; both patella and tibia short but former longer than latter in ratio of nearly 5 : 4; tibial retrolateral apophysis a long slender filament; bulb considerably swollen, with lobe overlapping ventral side of tibia; embolus rather short, with about one full turn of a loose spiral (Fig. 137).

Abdomen. Ovoid, longer than wide in ratio of 3 : 2, anal tubercle retracted and nearly invisible, spinnerets essentially as described by Petrunkevitch in the female, position of colulus indicated by a very minute tuft of short dark bristles, tracheal spiracle near base of spinnerets.

Color in alcohol. Color of palps already noted except the reddish brown tarsi. Chelicerae reddish brown with white hairs and scales as already noted. Lip and maxillae light brownish with yellowish tips. Sternum and coxae light brownish, dusted with gray. Legs: generally reddish brown with modifications by dark streaks, black hair, iridescence, and difference in shading; segments bearing heavy black fringes generally dark rich and waxy in appearance; tarsi generally lighter; white scales as noted on coxae and a few other places, perhaps in life nearly all segments carry a few of these, loosely arranged. Carapace: clypeus as noted; white spots and stripes essentially as described in female; lateral stripes begin in the male opposite first coxae; grayish yellow scales described in female as covering main part of head seem mostly rubbed off in these males. Abdominal pattern very close to that of female.

Note. When epigynum is dissected and viewed from inner surface it has appearance shown in Fig. 138.

Type locality. Male allotype and a male paratype from Chilibre, C. Z., July, 1939. Male paratypes and several females from the following localities: Gamboa, C. Z., Aug., 1939; Madden Dam region and C. Z. Forest Reserve, C. Z., July–Aug., 1939.

Corythalia quadriguttata (F. Cambridge), 1901

Sidusa quadriguttata F. Cambridge, 1901
C. quadriguttata Simon, 1903
C. quadriguttata Petrunkevitch, 1911
C. quadriguttata Petrunkevitch, 1925

The Peckhams had this species from Mexico but it has not yet appeared in my collection from Panama.

Corythalia serrapophysis (Chamberlin and Ivie) 1936

Figures 139–142

Freya serrapophysis Chamb. and Ivie, 1936

The correct position for this species is very much in doubt. It is plainly not a Freya, while several of its features seem to ally it to Corythalia. I believe it to be somewhat aberrant like *C. sulphurea* and, as in the case of that species, it seems best to place it tentatively in the genus Corythalia pending a better understanding of its natural

position in the system. For a long time I was reluctant to place the females which I have recognized here, but I have finally decided that this must be the correct place for them. The coloration of young males is sometimes very close to that of mature females. A male hypotype and a female allotype have been selected and described as follows:

Male hypotype. Total length 4.35 mm. Carapace 2.05 mm. long, 1.41 mm. wide just behind PLE which occupy about ten elevenths of width of carapace at that level, 1.30 mm. tall, and, therefore, about thirteen fourteenths as tall as wide; slightly swollen medially opposite PME; gently arched dorsally to beginning of steep posterior declivity which lies in last sixth of its length; with a short median longitudinal thoracic groove opposite posterior halves of PLE.

Eyes. Seen from in front, anterior row definitely projecting downward, recurved so that a line tangent to dorsal borders of AME cuts off about one fifth of diameter of ALE. Anterior row wider than posterior row in ratio of 12 : 11, wider than middle row in ratio of 4 : 3. Quadrangle of laterals wider than long in ratio of 22 : 15. Total eye space occupies sixteen thirty-firsts of length of carapace. Ratio of eyes AME: ALE : PME : PLE = 19 : 12 : 2 : 12. AME practically contiguous, separated from ALE by about one tenth of their diameter. Middle eyes closer to PLE than to ALE in ratio of 11 : 15. Height of clypeus equal to seven nineteenths of the diameter of AME. Clypeus decorated only with several light colored bristles but with no white hair. All anterior eyes with rust-red hair above, elsewhere surrounded with white hair.

Chelicerae. Vertical, essentially parallel, mildly excavated in front distally (degree of excavation varies greatly in different individuals); moderately robust, basal segment .75 mm. long; fang fairly robust, short, evenly curved. Fang groove with two promarginal teeth of moderate size, and a single stout retromarginal tooth.

Maxillae. Parallel, fairly robust, longer than wide in middle in ratio of 25 : 11; palp inserted into basal half; outer distal angle produced into a low blunt tubercle.

Lip. Only slightly longer than wide, basal excavations reach nearly one third of its length, reaches nearly three quarters the length of the maxillae. Sternal suture straight.

Sternum. Generally scutiform, longer than wide in ratio of 33 : 29, widest between second coxae, but nearly as wide between first coxae, posterior end bluntly rounded and not extended between fourth coxae which are almost contiguous.

Legs. 4312. Tibial index of first leg 17, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.22	.64	.83	.70	.50	3.89
2.	1.08	.57	.65	.70	.48	3.48
3.	1.28	.52	.77	1.02	.51	4.10
4.	1.30	.57	.96	1.08	.52	4.43
Palp	.58	.25	.26	—	.64	1.73

First leg with a mildly developed ventral fringe of black hair beginning at extreme distal end of femur and extending to the metatarsus; second leg with barest vestiges of a similar fringe.

Spines. First leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 1; patella only prolateral and retrolateral 0–1–0; tibia dorsal 1–0–0, prolateral 1–1–1(offset ventrally)–1, retrolateral 0–1–1(offset ventrally), ventral 2–2–2; metatarsus prolateral and retrolateral 1–1, ventral 2–2. Second leg: femur as in first except retrolateral distal 2; patella as in first; tibia dorsal and ventral as in first, prolateral 1–1(offset dorsally)–1, retrolateral 0–1–0; metatarsus as in first. Third leg: femur dorsal 0–1–1–1, prolateral and retrolateral only distal 2; patella only prolateral and retrolateral 0–1–0; tibia dorsal 1–0–0, prolateral and retrolateral 1–1(offset dorsally)–1, ventral 0–1p–2. Fourth leg: femur and patella as in third; tibia probably as in third; metatarsus only prolateral and retrolateral 1–1–2, ventral 0–1p–1p. First and second femora, patellae, and tibiae with much iridescence.

Palp. Femur curved prolaterally but not swollen; with a white fringe on retrolateral surface and a prominent erect white crest of hairs along distal two thirds of dorsal surface, a small tuft of shorter black hairs at distal end of prolateral surface. Similar fringes, less well developed, extend throughout patella, tibia, and tarsus. Both patella and tibia short and nearly of equal length. Retrolateral tibial apophysis a stout, somewhat flattened process nearly as broad at its somewhat serrated distal end as at its base. Bulb somewhat swollen, with a proximal extension which greatly overlaps the tibia. The embolus is in reality a closely twisted short spiral and not a series of serrations as shown in the drawings of the holotype palp (Figs. 139–140).

Abdomen. Elongate ovoid, rather small and slender, longer than wide in ratio of 35 : 17, widest about two fifths of its length from base; anal tubercle a fairly prominent cone; all spinnerets slender and of nearly equal length; position of colulus indicated by a small tuft of dark hairs; tracheal spiracle near base of spinnerets, without spiracular tubercle.

Color in alcohol. Carapace generally a mahogany brown, eyes on black spots, white hairs thinly dispersed over nearly entire region, rust-red hairs dorsal to anterior eyes, a narrow light colored streak from thoracic groove to beginning of steep posterior declivity. First and second legs generally dark brown with a light dorsal stripe, tarsi yellowish white. Third and fourth legs generally yellowish white with retrolateral dark stripes. Abdomen: with a central basal sagittate stripe extending about half the length of the region and lying within a yellowish white central stripe which contains very faint dark chevrons behind the sagittate stripe; on each side of this central area is a fairly broad dark stripe; dorsolaterally on each side is a narrow dark stripe extending from base about three fourths the length of the abdomen; lateral sides yellowish white; venter a deep black containing four longitudinal rows of yellowish dots; spinnerets all black. Much variation in the coloration has been noted among the males.

Female allotype. Total length 4.03 mm. Carapace 1.73 mm. long, 1.21 mm. wide at level of PLE, which occupy almost the full width of carapace at that level, .96 mm. tall, and therefore, about four fifths as tall as wide; general form essentially as in male but its features are subdued.

Eyes. Anterior row not directed downward as in male. Seen from in front, anterior row recurved so that dorsal borders of AME are almost level with those of ALE. Anterior row only slightly wider than posterior row and middle row. Quadrangle of laterals wider than long in ratio of 19 : 12. Total eye space occupies fourteen twenty-sevenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE= 17 : 11 : 2 : 10. AME almost contiguous, separated from ALE by about one twelfth of their diameter. Middle eyes only slightly closer to PLE than to ALE. Height of clypeus uncertain due to presence of thick white hair but probably about five seventeenths of the diameter of AME. Clypeus decorated by a mat of white hairs.

Chelicerae. Parallel, of moderate size, .60 mm. long in basal segment. Otherwise essentially as in male.

Maxillae and Lip. Essentially as in male except the former has no tubercle at outer distal corner.

Sternum. Scutiform; longer than wide in ratio of 16 : 13, widest opposite second coxae, only slightly narrower between first coxae; posterior end blunt and not extended between fourth coxae which are separated by two thirds of their width.

Legs. 4312. Tibial index of first leg 21, of fourth leg 15.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.84	.38	.56	.51	.33	2.62
2.	.75	.42	.46	.45	.32	2.40
3.	.97	.38	.58	.75	.38	3.06
4.	1.00	.40	.76	.83	.39	3.38

Legs without fringes. The palp has a fringe very similar to that of the male, even including the dorsal femoral crest of white hairs.

Spines. First leg: femur and patella as in male except retrolateral patellar spine is lacking; tibia only prolateral 0–1–1–0, retrolateral 0–1–0, ventral 2–2–2; metatarsus prolateral and retrolateral 1–1. ventral 2–2. Second leg: femur and patella as in first leg of male; tibia prolateral 1–1–0, retrolateral 0–1–0, ventral 2–2–2; metatarsus as in first. Third leg: femur dorsal 0–1–1–1, prolateral distal 2, retrolateral distal 1; patella prolateral and retrolateral 0–1–0; tibia prolateral and retrolateral 0-1-1, ventral 0-1p-2; metatarsus prolateral and retrolateral 1–2, ventral 1p–2. Fourth leg: femur dorsal 0–1–1–1, prolateral distal 1, retrolateral distal 2; patella as in third; tibia prolateral and retrolateral 1–1–1, ventral 0–1p–2(lacking on right side); metatarsus prolateral 1–1–2, retrolateral 1–1–1, ventral 0–1p–2.

Abdomen. Ovoid, longer than wide in ratio of 37 : 22, widest near middle. Otherwise essentially as in male.

Epigynum. A simple plate showing two relatively large spermathecae close to the posterior border and contiguous to one another; two circular, strongly chitinized areas lie just anterior to the spermathecae (Figs. 141–142).

Color in alcohol. Carapace: eyes on black spots; interocular area a light brownish; from thoracic groove a definite central light stripe extends to about the middle of the steep declivity; dorsolateral regions from ALE to posterior border a mahogany brown like that of male; from clypeus to posterior lateral angle there extends on each side a fairly broad yellowish white stripe; a narrow dark marginal line completes the pattern in this part of body. All legs yellowish white with a few dark spots. Abdomen: dorsally and laterally seven stripes appear as follows: a fairly broad central light stripe; on each side of this is a fairly broad dark brown stripe, then a narrower and shorter yellowish white stripe and, lastly, a narrow lateral black stripe. All four dark stripes unite at base of abdomen; venter yellowish white with two narrow broken black stripes; spinnerets all black.

Type locality. Male hypotype and female allotype from Canal Zone Biological Area, Aug., 1939. Numerous males and females from

the following localities: Canal Zone Biological Area, June–July, 1934; June–Aug., 1939; Balboa, C. Z., Aug., 1936; C. Z. Forest Reserve, C. Z., Aug., 1936, 1939; Porto Bello, R. P., Aug., 1936; Arraijan, R. P., Aug., 1936.

Corythalia spiralis (F. Cambridge), 1901

Figures 143–144

Sidusa spiralis F. Cambridge, 1901
C. spiralis Simon, 1903
C. spiralis Petrunkevitch, 1911
C. spiralis Petrunkevitch, 1925
C. spiralis Banks, 1929
C. murcida Banks, 1929

F. Cambridge had only males. Mr. Banks found males common in several places in the Canal Zone visited by him in 1924. He also found a female which he identified as *C. murcida* (F. Cambridge), but I believe it to be a female of *C. spiralis* (F. Cambridge). The male has marked features to aid in its identification: the white marks are easily rubbed off and their absence may cause confusion if much reliance is placed upon them; the first three pairs of legs are heavily fringed; the third tibia and third metatarsus are strongly iridescent, bluish or purplish, and bevelled dorsally and laterally so that sharp ridges or carinae are formed; this is also true of the first and second legs but to a lesser degree; the embolus is strongly spiraloid with almost two full turns; the retrolateral tibial apophysis is long, slender, and usually divergent.

Female allotype. Total length 6.02 mm. Carapace 3.20 mm. long, 2.18 mm. wide, 1.46 mm. tall and, therefore, almost exactly two thirds as tall as wide; PLE occupy eighty-seven one hundredths of width of carapace at their level; with numerous long black bristles in vicinity of eyes but with no tufts, shorter bristles in interocular area, much shorter procumbent black hair and many dark scale-like hairs; a shallow depression between PLE; a short median longitudinal thoracic groove at posterior border of median depression; with the usual general form of the genus.

Eyes. Anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one seventh of diameter of ALE. Posterior row slightly wider than anterior row. Middle row almost as wide as anterior row. Quadrangle of laterals wider than long in ratio of 29 : 18. Total eye space occupies eight nineteenths of length of carapace. Ratio of

eyes AME : ALE : PME : PLE = 25 : 14 : 4 : 14. AME separated from one another by one tenth of their diameter, from ALE by four twenty-fifths of their diameter. Middle eyes slightly closer to PLE than to ALE. Height of clypeus equal to nearly one half of the diameter of AME. Clypeus decorated with a fringe of loose white scales and many bristles along its ventral margin, dorsal to fringe is a narrow band of white scales, above the band are seven long stiff bristles, three of these form a triangle in lower angle between AME and two more stand on each side beneath AME, also scattered bristles elsewhere.

Chelicerae. Robust, vertical, just a little convergent; with scattered white scales over basal half of front surface together with short weak bristles and stiffer black ones along medial surface. Fang moderately robust, short, evenly curved. Fang groove with the usual soft promarginal ridge bearing twelve black bristles and beyond the ridge a single simple tooth; the retromargin bears a small, single, simple, very slender tooth.

Maxillae. Moderately convergent; only slightly concave along outer margin; considerably dilated distally; longer than wide in middle in ratio of about 9 : 5; outer distal angle very gradually rounded; with well developed scopula along truncature; covered with numerous long and short black bristles.

Lip. Almost as wide as long; with basal excavations reaching about one third of its length; reaches about four sevenths of length of maxillae; nearly triangular from distal ends of excavations; distal end only one third as wide as base; with many long and short bristles. Sternal suture straight.

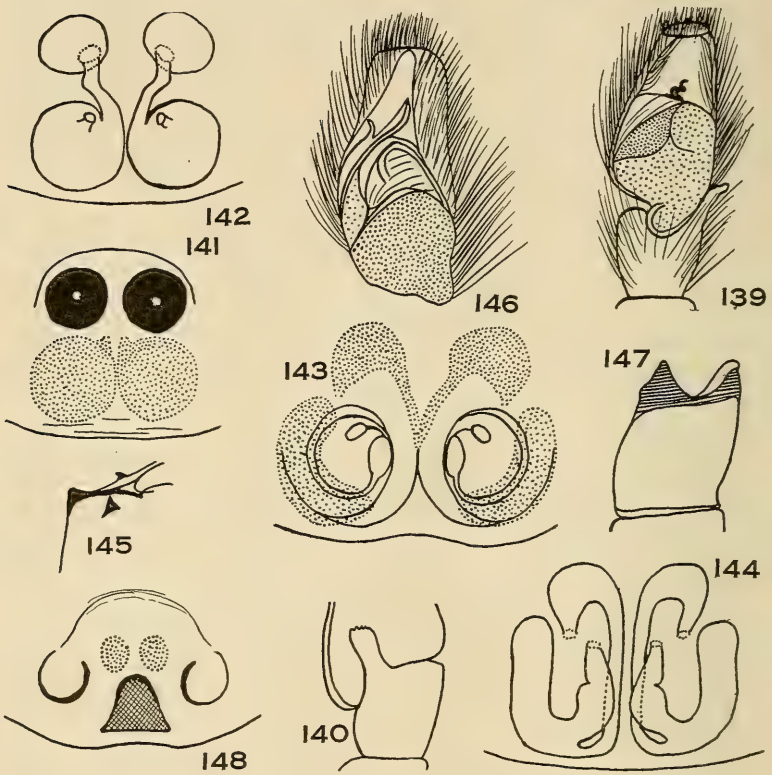
Sternum. Generally scutiform; longer than wide in ratio of about 7 : 5, widest between second coxae, nearly as wide between first coxae; posterior end blunt and not extended between fourth coxae which are separated by one sixth of the width.

Legs. 4312. Tibial index of first leg 30, of fourth leg 21.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.60	1.02	.90	.83	.51	4.86
2.	1.54	.89	.85	.82	.45	4.55
3.	1.79	.89	1.00	1.21	.57	5.46
4.	1.92	.89	1.18	1.34	.56	5.89

All legs hairy, but with no definite fringes.

Spines. First leg: femur only dorsal 0–0–1–1–1, prolateral distal 2, retrolateral distal 1; patella only prolateral 0–1–0; tibia only prolateral



External Anatomy of Spiders

Figs. 139–140. *Corythalia serrapophysis*, male palp, ventral view and tibial apophysis, retrolateral view.

Figs. 141–142. *C. serrapophysis*, epigynum, ventral view, and dissected, viewed from within.

Figs. 143–144. *Corythalia spiralis*, epigynum, ventral view, and dissected, viewed from within.

Fig. 145. *Freya arraijanica* Chickering,; male cheliceral teeth.

Figs. 146–147. *F. arraijanica* Chickering; male palp, ventral view, and palpal tibia, retrolateral view.

Fig. 148. *F. arraijanica* Chickering; epigynum, ventral view.

1–2, ventral 2–1r–2; metatarsus only prolateral and retrolateral 1–1, ventral 2–2. Second leg: femur and patella as in first except femur retrolateral distal 2; tibia prolateral 1–1–1, retrolateral 0–1, ventral 1r–1r–2; metatarsus as in first. Third leg: femur as in second; patella prolateral and retrolateral 0–1–0; tibia dorsal 1–0, prolateral and retrolateral 1–1–1, ventral 0; metatarsus dorsal 1–0, prolateral 1–1–2, retrolateral 1–2, ventral 0–2–2. Fourth leg: femur and patella as in third except femur prolateral distal 1; tibia as in third; metatarsus only prolateral 1–1–2, retrolateral 1–2–2 on left, 1–1–2 on right, ventral 0–2–2.

Abdomen. Broadly ovoid, longer than wide in ratio of 11 : 8, widest in middle; anal tubercle a very short broad cone; anterior spinnerets most robust and contiguous, middle and posterior pairs about equally slender, middle spinnerets as long as anteriors and longer than posteriors which are spread out so as to expose the middle pair to view from above. Position of colulus indicated by a small group of short black bristles. Tracheal spiracle near base of spinnerets.

Epigynum. Follows the general pattern for Corythalia; circular areas separated for a considerable distance by a transparent septum which is very easily overlooked; circular areas each with a small oval depression near anterior border and a larger oval body near medial side of each (position of this body varies somewhat in different specimens); two somewhat pyriform spermathecae lie anterior to circular areas and two more elongated sacs appear near outer borders of epigynal plate; dissection shows that these internal parts are approximately like that which is seen externally, and that in addition there are several complicated chitinized ductules (Figs. 143–144).

Color in alcohol. Chelicerae reddish brown, except the yellowish white in region of fang groove. Palps: femora yellowish streaked with gray, distal ends covered with white scales; patellae also covered dorsally with white scales; tibia yellowish with white and black hairs; tarsus reddish brown with much mixed black and light gray hair. Legs: brown with many variations; many white scales especially distal ends of first femora and proximal ends of all other femora. Carapace: generally brown; black around eyes and very dark in interocular area with light colored scales; a small white spot between PME and PLE; another small white spot behind and medial to PLE; a small median white spot at beginning of posterior declivity (divided in some paratypes); a broad marginal stripe from opposite PME to posterolateral corner. Sternum light brown with gray dots. Abdomen with a very beautiful color pattern: a black basal spot followed by a narrow irregular white band which continues as a lateral stripe on each side as far

as middle; then a nearly black, broad, somewhat oblique band which also continues to lateral sides; then a short chestnut brown bar followed by a narrow white band nearly divided in middle; then another chestnut brown bar broad in the middle, continuous with a shorter chestnut brown bar and separated from it except in the middle by a pair of short narrow white bars; venter generally yellowish with a broad, central, dark, somewhat U-shaped mark.

Type locality. Female allotype from Canal Zone Biological Area, Aug., 1939. Paratype females and males from the following localities: Canal Zone Biological Area, June–July, 1934; June–Aug., 1936; July–Sept., 1939; Porto Bello, R. P., Aug., 1936; El Valle, R. P., July, 1936; Ft. Randolph, C. Z., Aug., 1936; France Field, C. Z., Aug., 1939; Boquete, R. P., July, 1939.

Corythalia spirorbis (F. Cambridge), 1901

Sidusa spirorbis F. Cambridge, 1901
C. spirorbis Simon, 1903
C. spirorbis Petrunkevitch, 1911
C. spirorbis Petrunkevitch, 1925

F. Cambridge had only the male of this species in which fringes are restricted to the first pair of legs. The female remains unknown, and, so far as I know, nobody has collected the species since the original specimens were found and studied.

Corythalia sulphurea (F. Cambridge), 1901

Sidusa sulphurea F. Cambridge, 1901
C. sulphurea Simon, 1903
S. sulphurea Banks, 1909
C. sulphurea Petrunkevitch, 1911
C. sulphurea Petrunkevitch, 1925
C. conformans Chamberlin and Ivie, 1936

Professor Petrunkevitch ('25) has carefully described both sexes of this species, but is somewhat puzzled as to its proper position in the system of Salticidae. The uncertainty concerning its relationships to Corythalia and related genera still remains. The male palp has the following important features: femur and patella covered with a thick coat of yellowish white scale-like hairs; tibia yellowish but devoid of yellowish white hairs; tibial apophysis long and slender; embolus makes only about a half a turn of a spiral. The epigynum has two circular

areas almost in contact medially and more than a full diameter removed from the genital groove; there are two spermathecae visible externally and each is somewhat larger than the corresponding half of the epigynal plate; dissection of the epigynum reveals that there are only two spermathecae internally. There are no fringes on the legs of either sex. The only conspicuous color feature on the carapace is the large yellowish white patch on the posterolateral corner on each side; the abdomen has a broad basal yellowish white bar narrowed in the middle, just behind the middle is a narrow dorsolateral bar somewhat recurved on each side, and still farther back a small somewhat elongated spot on each side. I have the species from the following localities: Canal Zone Biological Area, June–July, 1934; June–Aug., 1936; July–Aug., 1939; Balboa, C. Z., Aug., 1936; El Valle, R. P., July, 1936; Porto Bello, R. P., Aug., 1936; Madden Dam region, C. Z., Aug., 1939.

Corythalia voluta (F. Cambridge), 1901

Sidusa voluta F. Cambridge, 1901
C. voluta Simon, 1903
C. voluta Petrunkevitch, 1911
C. voluta Petrunkevitch, 1925

I have three females from Boquete, R. P., July, 1939, which I believe to belong to this species. The epigynum is very distinctive among all of the Corythaliae I have seen from Panama. One of my females should be described as the hypotype. Males are still unknown.

Genus Freya C. Koch, 1850

Petrunkevitch ('25) listed ten species of the genus Freya known from Panama at the time of publication of his paper. *F. distincta* Petrunkevitch is now regarded as a synonym of *F. grisea* (F. Cambridge). *Freya bilobata* (F. Cambridge) is transferred to the genus Phiale. Banks ('29) identified seven species from the vicinity of the Canal Zone. These included two new species: *F. frontalis* Banks and *F. justina* Banks. Mr. Banks identified a female as *F. flava* (F. Cambridge), but I consider it as a Phiale and the same as I have described as a new species. The male which he identified as *F. rustica* (Peckham) is *F. demarcata* Chamberlin and Ivie. Chamberlin and Ivie ('36) described five new species of Freya from my collection of 1928. *F. serrapophysis* C. and I. has been transferred to the genus Cory-

thalia. *F. nannispina* is believed to be a synonym of *Phiale dybowskii* (Taczanowski) and is so treated in this paper. *F. uncinella* C. and I. is believed to be a synonym of *F. bifurcata* (F. Cambridge) and *F. sagittifer* C. and I. is regarded as the female of *F. frontalis* Banks. In my study of the genus Freya from Panama I have been compelled to recognize and describe three new species. Including these additions to the list of known species of the genus from Panama and with the changes in synonymy which have been pointed out we may list the sixteen known species as follows: *F. albosignata* (F. Cambridge), *F. arraijanica* sp. nov., *F. bicavata* (F. Cambridge), *F. bifida* (F. Cambridge), *F. bifurcata* (F. Cambridge), *F. bulbosa* (F. Cambridge), *F. demarcata* Chamberlin and Ivie, *F. frontalis* Banks, *F. grisea* (F. Cambridge), *F. infuscata* (F. Cambridge), *F. justina* Banks, *F. longispina* (F. Cambridge), *F. minuta* (F. Cambridge), *F. petrunkevitchi* sp. nov., *F. prominens* (F. Cambridge), *F. striata* sp. nov. I have in my collection all of the above named species except the following: *F. bicavata, F. bifida,* and *F. minuta.*

Key to the species of Freya from Panama

Males

1. Carapace with no white stripes or definite spots; clypeus with a sparse covering of long white hair continued over base of chelicerae. Palp: embolus extends along prolateral side of bulb as part of a flat broad band, distally divided into a short prolateral hook and a broader longer terminal part; tibial retrolateral apophysis short, broad at base, with a pointed tip turned almost directly toward base of tarsus..... *F. arraijanica,* (p. 170)
1. Not with combination of characters given above.....2
2. (Taken from F. Cambridge's work) Carapace with a broad white marginal stripe on each side which includes clypeus. Palp: bulb with a stout concavo-convex process in anterior third; tibial retrolateral apophysis a broad ridge..... *F. bifida,* (p. 173)
2. Not with combination of characters given above.....3
3. Carapace with a broad white marginal stripe on each side including the clypeus, also with a fairly broad white band between ALE, and a median white stripe from between PLE nearly to posterior border. Palp: tarsal distal spine bifurcated distally to form two slender tips, the medial of which is much the shorter; tibial retrolateral apophysis a long, fairly stout, somewhat divergent spur slightly hooked terminally..... *F. bifurcata,* (p. 174)
3. Not with combination of characters given above.....4
4. Carapace with broad white marginal stripe on each side from posterolateral corner to AME and continued across the clypeus, also a central narrow

white stripe between PLE to steep posterior declivity, and a white spot between PME and PLE on each side. Palp: with a transversely swollen bulb; with a long, slender, gently sinuous embolus springing from the prolateral side of bulb near distal end; tibial retrolateral apophysis a short spur rounded distally ..... *F. bulbosa*, (p. 174)

4. Not with combination of characters given above 5
5. Carapace with a broad white marginal stripe on each side from posterolateral angle to AME including clypeus, also a white central spot behind AME and a small white spot on each side between PME and PLE; base of chelicerae also covered with fairly dense white hair. Palp: with a very stout spiraloid distal tarsal spine; tibia deeply excavate ventrally and with a short beak-like retrolateral distal apophysis..... *F. demarcata*, (p. 177)
5. Not with combination of characters given above 6
6. Carapace with a broad white marginal stripe on each side from posterolateral angle to opposite PLE, also a large white median spot behind AME narrowly connected with a short white stripe between PLE. Clypeus with a moderate supply of long white hair which extends over bases of chelicerae. Palp: with a narrow swollen constricted bulb, a long slender embolus arising near base of bulb and swinging prolaterally in a wide arc; retrolateral tibial apophysis a stout spur of moderate length.... *F. frontalis*, (p. 181)
6. Not with combination of characters given above 7
7. Carapace with a short broad white marginal stripe from posterolateral angle on each side to opposite PLE. Chelicerae with a rich growth of white hair over basal two thirds. Palp: embolus arises on prolateral side of bulb, passes forward somewhat obliquely as a moderately slender spine of moderate length; tibia bilobed distally, with a short stout retrolateral apophysis turned at a right angle toward bulb ..... *F. grisea*, (p. 182)
7. Not with combination of characters given above 8
8. Carapace with a broad white marginal stripe on each side from posterolateral angle to AME; with a few long white hairs on clypeus; a large median white spot just behind AME and another somewhat diamond shaped median white spot just behind PLE. Palp: with embolus encircling bulb and curled nearly into a second small circle near distal border of this organ; tibial retrolateral apophysis a short stout hook.. *F. justina*, (p. 182)
8. Not with combination of characters given above 9
9. Carapace with a moderately broad white marginal stripe on each side to AME, but not continuous across clypeus; also a white median spot (may be divided) behind PME; also a median white stripe from just behind PME nearly to posterior margin. Palp: bulb swollen, with small posterior lobule; embolus a fairly stout, somewhat flattened spine, terminally very slender, pointed and turned retrolaterally at tip; tibial retrolateral apophysis long, slender and divergent ..... *F. longispina*, (p. 185)
9. Not with combination of characters given above 10
10. (Taken from F. Cambridge's work) A small species. Carapace with a white marginal stripe on each side including clypeus. Palp: bulb without

a definite spine but with a broad chitinized process at distal end; tibial retrolateral apophysis a short broad process with a short hook.....
F. minuta, (p. 185)

10. Not with combination of characters given above.....11
11. Carapace only with a light median stripe from thoracic furrow nearly to posterior border; scattered white hairs over most of surface and a faint white patch behind AME. Palp: bulb with a very small, sharply pointed spine at distal end; tibia bilobed distally; tibial retrolateral apophysis a stout spur constricted near base.....*F. petrunkevitchi*, (p. 185)
11. Not with combination of characters given above.....12
12. Carapace with a broad white marginal stripe along each side to AME; clypeus devoid of white hairs, but bases of chelicerae well covered with white hair; also a median white spot between ALE, and a larger, rather poorly defined, median white spot behind PLE; Palp: bulb swollen, obliquely elongated; embolus arises near base on retrolateral side, curves around base and prolateral side of bulb and inserts into a tarsal recess where its tip is attenuated and turned at a right angle; tibial retrolateral apophysis a stout spur with a fairly long dorsal extension and a shorter ventral one.....*F. prominens*, (p. 188)
12. Carapace without lateral marginal stripes, but with a light central stripe from between PLE to posterior border. Palp: bulb moderately swollen, largely overlaps tibia; near middle on prolateral side arises tarsal spine, moderately long, nearly straight and pointed; tibial retrolateral apophysis a very short spur directed ventrally.....*F. striata*, (p. 188)

Females

1. Carapace only with a short, somewhat sagittate, median stripe from thoracic groove nearly to posterior border, elsewhere reddish brown; clypeus only with a ventral fringe of white hairs. Epigynum: with a moderately deep posterior marginal notch and a recess; with two deep confluent depressions occupying anterior half of epigynal plate.....
F. albosignata, (p. 168)
1. Not with combination of characters given above.....2
2. Carapace reddish brown in interocular region, elsewhere generally lighter brown, with a yellowish median stripe from thoracic groove to posterior border; clypeus with a ventral fringe of white hairs. Epigynum: with a moderately deep posterior marginal notch and a long recess; with a pair of deep depressions occupying lateral sides of epigynal plate and nearly twice the diameter of one of them apart.....*F. arraijanica*, (p. 170)
2. Not with combination of characters given above.....3
3. (Taken from F. Cambridge's work) Carapace generally reddish brown, with a short median light colored stripe from thoracic groove nearly (or quite) to posterior margin, much lighter in interocular region. Epigynum: with a slightly notched posterior margin which bears a rounded prominence

(probably also with a recess beneath); with a pair of large reniform depressions, convergent in front, occupying lateral parts of epigynal plate.....
F. bicavata, (p. 173)

3. Not with combination of characters given above.....4
4. Carapace; generally reddish brown; with a distinct sagittate white median stripe from between PLE to posterior border; very narrow in middle of posterior declivity; with many white hairs along lateral sides and in interocular area; clypeus with well developed ventral fringe of long white hairs. Epigynum: with slight posterior marginal notch but with an obscure recess; with a pair of small apertures on lateral sides of epigynal plate.....
F. frontalis, (p. 181)
4. Not with combination of characters given above.....5
5. Carapace: generally reddish brown; with a broad white lateral stripe on each side from posterolateral corner to opposite PLE; a lighter area behind PLE from which an obscure lighter median stripe extends nearly to posterior border; clypeus with a poorly developed ventral fringe of white hairs. Epigynum: with a well rounded posterior margin which bears a distinct central prominence beneath which is a deep recess; with a pair of large reniform depressions nearly transverse in position and confluent medially, each with a central aperture..... *F. infuscata*, (p. 182)
5. Not with combination of characters given above.....6
6. Carapace: generally light reddish brown; lateral sides white, somewhat spotted with reddish brown; with a fairly broad white stripe from thoracic groove to posterior border; clypeus with numerous long white hairs. Epigynum: with a deep posterior marginal notch and a fairly deep recess; anterior half of epigynal plate occupied by a large central oval depression divided by a low central septum..... *F. justina*, (p. 182)
6. Not with combination of characters given above.....7
7. Carapace: generally reddish brown, darker in ocular area; lateral sides from posterolateral angle to opposite PLE with many loose white hairs making an obscure stripe; lighter behind PLE with an obscure median stripe extending nearly to posterior border; clypeus with few white hairs. Epigynum: without a posterior marginal notch; with a median marginal prominence beneath which lies a deep recess; with a pair of rather small depressions in anterior third of epigynal plate about twice the diameter of one of them apart..... *F. prominens*, (p. 188)
7. A small species, from three to four mm. long. Carapace: generally light brown; with only a central light stripe from thoracic groove to posterior border; clypeus with very few white hairs. Epigynum: simple, obscure; posterior margin without a median notch and with no visible recess; a pair of shallow depressions occupy anterior half of epigynal plate, each containing what appears to be a small central aperture..... *F. striata*, (p. 188)

Freya albosignata (F. Cambridge), 1901

Cyrene albosignata F. Cambridge, 1901
F. albosignata Petrunkevitch, 1911

Although all we have by which to identify this species is F. Cambridge's clear figure of the epigynum, a colored drawing of the spider itself, and a few statements concerning spination I feel quite certain of the correct identification. The male is not definitely known, but I suspect that *F. demarcata* Chamberlin and Ivie belongs with these females.

Female hypotype. Total length 7.80 mm. Carapace 3.20 mm. long, 2.34 mm. wide at level of PLE which occupy a little less than the full width of the carapace at their level, 1.79 mm. tall and, therefore, slightly more than three fourths as tall as wide; PLE on low tubercle; just median to and slightly in front of PME is also a low swelling; depressed a little in the middle between PLE; with a fairly prominent median longitudinal thoracic groove beginning opposite PLE.

Eyes. Viewed from in front, anterior row recurved so that dorsal borders are all on the same level. Anterior row wider than posterior row in ratio of 14 : 13. Posterior row wider than middle row in ratio of 13 : 12. Quadrangle of laterals wider than long in ratio of 35 : 23. Total eye space occupies seven twelfths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 34 : 20 : 5 : 19. AME contiguous and barely separated from ALE. Middle eyes closer to PLE than to ALE in ratio of 15 : 22. Height of clypeus equal to about one fifth of the diameter of AME. Clypeus decorated with simple white hairs along its ventral border except in middle where they are lacking; white hairs also lacking beneath outer borders of AME; appressed white hairs beneath ALE; three long bristles in a triangle in lower angle between AME and two more bristles on each side beneath AME.

Chelicerae. Robust, very gibbous at base in front, parallel, basal segment 1.11 mm. long. Fang moderately slender, evenly curved. Fang groove with two promarginal teeth and a single simple retromarginal tooth.

Maxillae. Parallel, longer than wide in middle in ratio of about 2 : 1, palp inserted into basal two fifths, considerably dilated at distal end, outer distal corner regularly rounded.

Lip. Longer than wide in ratio of about 23 : 20, basal excavations reach about two fifths of length of organ, reaches slightly beyond middle of maxillae. Sternal suture straight.

Sternum. Generally scutiform, quite convex, longer than wide in

ratio of about 29 : 19, widest between second coxae, very blunt at posterior end and not extended between fourth coxae which are separated by only three twenty-fifths of their width.

Legs. 4312. Tibial index of first leg 20, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.92	1.28	1.25	1.09	.77	6.31
2.	1.79	1.15	1.08	.95	.70	5.67
3.	2.30	1.15	1.28	1.54	.82	7.09
4.	2.24	1.02	1.41	1.60	.84	7.11

First leg considerably the stoutest. All legs with a moderate amount of hair but with no fringes.

Spines. First leg: femur only dorsal 0–0–1–1–1, prolateral distal 2; patella 0; tibia only prolateral 0–0–1, ventral 2–2–2; metatarsus only ventral 2–2. Second leg: femur and patella as in first; tibia only prolateral 1–0–1, ventral 1r–2–2; metatarsus as in first. Third leg: femur as in first except retrolateral distal 1; patella only prolateral 0–1–0 and retrolateral 0–1–0; tibia dorsal 0, prolateral and retrolateral 1–1–1, ventral 0–1p–2; metatarsus dorsal 0–1r–2, prolateral 1–1–1, retrolateral 1–0–1, ventral 2–2. Fourth leg: femur only dorsal as in first and retrolateral distal 1; patella and tibia as in third; metatarsus as in third except retrolateral 1–1–1 and ventral 1p–2. Palpal spines: femur dorsal distal 1, short, erect.

Abdomen. Longer than wide in ratio of 68 : 37, widest about one third from base from which place it tapers nearly to a point at posterior end; anal tubercle a short broad cone covered with whitish hairs; spinnerets of moderate length, all rather slender, posterior pair spread so that middle pair is clearly exposed to view. Position of colulus indicated by a tuft of dark bristles. Tracheal spiracle near base of spinnerets and not guarded by a tubercle.

Epigynum. Cambridge's Fig. 16a, Tab. 19 is a good drawing of this organ. The large transverse cavity has two secondary cavities which open into internal tubules; these were shown in the drawing but not referred to in the text.

Color in alcohol. Palp: yellowish white ventrally except tarsus which is reddish brown; dorsally patella is light gray and tibia is streaked with brown in proximal half. Chelicerae rich reddish brown. Maxillae and lip lighter with yellowish white tips. Sternum light yellowish. Legs: all coxae light yellowish; first legs elsewhere generally dark reddish brown, femur light ventrally in proximal half and dorsally light

throughout with a narrow central dark stripe which continues through proximal half of patella, tibia also with lighter dorsal stripe and ventrally light on distal half, metatarsus and tarsus progressively lighter toward tip; second legs almost unicolorous light amber; third and fourth legs like the second with a few faint dark annulations and spots. Carapace: generally dark reddish brown with eyes on black spots; a small patch of loose white scales between PME and PLE; numerous long black bristles around eyes; white hairs around eyes of anterior row and a few white hairs between ALE; also a few white hairs in cheek region below ALE and PME together with a few dull reddish hairs around region of ALE to PLE; a median light yellowish stripe overlaid with loose white hairs beginning at anterior end of thoracic groove, rapidly widening to beginning of steep posterior declivity where it narrows and terminates before reaching middle of posterior border. Abdomen: a dark brown basal spot is followed by a broad light yellowish basal band which continues laterally but is there broken into irregular oblique bars shown in Cambridge's Fig. 16; a narrow median dorsal indented stripe extends from the basal yellowish band to anal tubercle; regions lateral to the central white stripe are made up of brownish stripes more or less broken into spots; on the hypotype and on most other females there is a pair of nearly black spots just where the brownish stripes begin and another pair of black spots about two thirds back from base; lateral sides with narrow broken yellowish stripes alternating with broader nearly black broken stripes; venter with a broad nearly black central stripe narrowed somewhat at posterior end; in many specimens the stripe is broken into small black spots irregularly distributed over the whole region.

Type locality. Female hypotype from Canal Zone Biological Area, Aug., 1939. Appears to be a very common species throughout the region of the Canal Zone where I have collected it in the following localities: Canal Zone Biological Area, June–July, 1934; June–Aug., 1936; June–Aug., 1939; C. Z. Forest Reserve and Madden Dam region, July–Aug., 1939; Porto Bello, R. P., Aug., 1936.

Freya arraijanica spec. nov.

Figures 145–148

Male holotype. Total length 8.51 mm. Carapace 4.10 mm. long, 3.13 mm. wide a little behind PLE where it is widest; generally robust and well rounded along lateral sides; PLE occupy forty forty-sevenths

of width of carapace at that level; 2.05 mm. tall and, therefore, about two thirds as tall as wide; posterior declivity quite gradual from PLE to posterior border; with a short median longitudinal thoracic groove between PLE.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one fifth of the diameter of ALE. Anterior row definitely directed downward. Anterior row only slightly wider than posterior row, wider than middle row in ratio of 41 : 35. Quadrangle of laterals wider than long in ratio of 41 : 28. Total eye space occupies thirty-five sixty-firsts of length of carapace. Ratio of eyes AME : ALE : PME : PLE=13 : 7 : 2 : 6.5. AME separated from one another by one thirteenth of their diameter, from ALE by about one eighth of their diameter. Middle eyes only slightly closer to PLE than to ALE. Height of clypeus equal to about one third of diameter of AME. Clypeus decorated with a sparse covering of long white hair mingled with the sparse white hair covering base of chelicerae.

Chelicerae. Fairly robust, vertical, parallel; with basal segment 1.40 mm. long; anterior surface rugulose and covered with a sparse growth of long white hair and swollen obliquely into a broad ridge from inner proximal angle toward outer distal angle, but it disappears about one third of the distance to the border. Fang moderately stout and evenly curved. Fang groove with two low promarginal teeth far apart; with a single small retromarginal tooth and a low blade-like ridge which extends somewhat obliquely across the groove from the larger promarginal tooth toward the base of fang (Fig. 145).

Maxillae. Parallel, longer than wide in middle in ratio of 17 : 8, outer border more deeply notched than usual, but without a tubercle at outer distal angle, a well developed scopula along truncature.

Lip. Longer than wide in ratio of 33 : 30, basal excavations inconspicuous, reach about one third length of organ, reaches well beyond middle of maxillae. Sternal suture straight.

Sternum. Elongate scutiform, longer than wide in ratio of 4 : 3. posterior two thirds quite convex, with numerous slender bristles, widest between second coxae, posterior end blunt and not extended between fourth coxae which are only separated by about one tenth of their width.

Legs. 1432. Tibial index of first leg 16, of fourth leg 15.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.75	1.66	2.11	1.66	1.08	9.26
2.	2.43	1.34	1.54	1.28	.96	7.55
3.	2.56	1.34	1.41	1.92	1.08	8.31
4.	2.75	1.15	1.78	2.24	1.08	9.00
Palp	1.21	.49	.45	—	1.02	3.17

All legs with a fairly good covering of hair. First pair with a well developed ventral fringe beginning at distal end of femur along retromargin and extending throughout metatarsus. Second pair like the first but with fringe reduced.

Spines. First leg: femur only dorsal 0–1–1–1 and prolateral distal 2; patella only prolateral 0–1(small)–0; tibia only prolateral 1–0–0, ventral 2–2–2; metatarsus only ventral 2–2(almost lateral). Second leg: femur as in first except retrolateral 0–1–1; patella as in first; tibia as in first except prolateral 1–1–0; metatarsus only prolateral 0–1, ventral 2–2. Third leg: femur dorsal 0–1–1–1, prolateral 0–1–2, retrolateral only distal 1; patella only prolateral and retrolateral 0–1–0; tibia dorsal 1–0–0, prolateral 1–1–1, retrolateral 1–1–1–0, ventral 0–1p–2; metatarsus prolateral 1–2, retrolateral 1–1(offset dorsally)–2, ventral 2–2. Fourth leg: femur, patella and tibia as in third; metatarsus prolateral and retrolateral 1–1–2, ventral 2–2. Palpal spines: femur dorsal 0–1–1–1, elsewhere 0.

Palp. No special modifications except in tibia and tarsus. Patella and tibia nearly equal in length. Tarsus with a moderately swollen bulb. Embolus arises in a thick membranous process near base on prolateral side and extends anteriorly curving medially and dividing into a short prolateral hook and a somewhat longer portion which extends toward distal end of tarsus (Fig. 146). The tibial apophysis is short, stout at base, sharply pointed and turned almost directly toward base of tarsus much as in *F. grisea* (F. Cambridge).

Abdomen. Elongate ovoid, longer than wide in ratio of 34 : 20, widest about one third from base; with two pairs of sigilla making a quadrilateral figure wider behind than in front in ratio of about 16 : 13; well covered with light brownish hairs and numerous long slender bristles. Anal tubercle a short, blunt, yellowish white cone. All spinnerets rather slender, anterior pair somewhat the stoutest, posterior pair slightly the longest and spread so as to expose to view the middle pair which are the slenderest and a little the shortest. Position of colulus indicated by a small tuft of dark stiff hairs. Tracheal spiracle near base of spinnerets, obscured by whitish hairs.

Color in alcohol. Carapace a rich reddish brown with eyes on black spots, darker near ventral margin, with curved black lines on posterior declivity, with a few white hairs over surface generally, and a few rust-red hairs around eyes; with no white stripes or definite spots. All legs dark brownish with lighter dorsal surfaces, first two pairs the darkest. Chelicerae a rich reddish brown. Maxillae and lip a deep amber color with yellowish tips. Sternum an amber color. Abdomen: generally light brownish; with an obscure central lighter stripe enclosing chevrons posteriorly; an indefinite light grayish spot at base which continues for some distance dorsolaterally; lateral to the central lighter stripe is a brownish indefinite stripe much spotted with yellowish dots; venter very dark brown, bordered by rows of irregular yellowish dots and enclosing a pair of rows of yellowish dots near the center; basal third of anterior spinnerets yellowish, remainder black.

Female allotype. Two females have been found which match well with the single male. These were not recognized until so late in the preparation of this paper that a complete description could not well be included. Some important characters have been mentioned in the key and a drawing of the epigynum has been included (Fig. 148).

Type locality. Male holotype and female allotype from Arraijan, R. P., Aug., 1936. One female paratype.

Freya bicavata (F. Cambridge), 1901

Cyrene bicavata F. Cambridge, 1901
F. bicavata Petrunkevitch, 1911
F. bicavata Petrunkevitch, 1925

This species has not yet appeared in my collection and, so far as I know, it has not been taken since the original collections studied by F. Cambridge who had only the female.

Freya bifida (F. Cambridge), 1901

Cyrene bifida F. Cambridge, 1901
F. bifida Simon, 1903
F. bifida Petrunkevitch, 1911
F. bifida Petrunkevitch, 1925

This is another species which has not yet appeared in my collections. It is rare in collections and probably has not been taken since the collections were made which F. Cambridge studied.

Freya bifurcata (F. Cambridge), 1901

Cyrene bifurcata F. Cambridge, 1901
F. bifurcata Simon, 1903
F. bifurcata Petrunkevitch, 1911
F. bifurcata Petrunkevitch, 1925
F. bifurcata Banks, 1929
F. uncinella Chamberlin and Ivie, 1936

Professor Petrunkevitch has given a carefully detailed description of the male of the species ('25) together with good figures of the male palpus. The female is still unknown. I have the species in my collection from the following localities: Canal Zone Biological Area, June–July, 1934; July–Aug., 1939; El Valle, R. P,. July, 1936; Ft. Randolph, C. Z., Aug., 1936; C. Z. Forest Reserve, C. Z., July–Aug., 1939; France Field, C. Z., Aug., 1939; Boquete, R. P., July, 1939.

Freya bulbosa (F. Cambridge), 1901

Figures 149–150

Cyrene bulbosa F. Cambridge, 1901
F. bulbosa Petrunkevitch, 1911
F. bulbosa Petrunkevitch, 1925

This species was established on the basis of a single much-rubbed male specimen in which the abdomen had been destroyed. Its palpal features are so distinctive that its identification seems certain, however.

Male hypotype. Total length 6.21 mm. Carapace 3.07 mm. long, 2.23 mm. wide a short distance behind PLE which occupy nine elevenths of the full width of carapace at that level, 1.47 mm. tall and, therefore, almost two thirds as tall as wide; cephalic part rises gradually to PLE and then very gradually declines to steep posterior declivity which begins about three fifths of distance from PLE to posterior border; interocular area nearly flat, PLE and PME only slightly raised; only a slight median depression behind PLE; a short median longitudinal thoracic groove begins well behind a line tangent to posterior border of PLE; covered with a copious supply of black procumbent hair except where the white spots and stripes occur.

Eyes. Viewed from in front, anterior row recurved so that dorsal borders of all are on the same level. Anterior row wider than posterior row in ratio of 27 : 25. Anterior row wider than middle row in ratio of 27 : 23. Quadrangle of laterals wider than long in ratio of 27 : 19. Total eye space occupies eleven twenty-thirds of length of carapace.

Ratio of eyes AME: ALE : PME : PLE 27 : 14 : 4 : 12. AME separated from one another by one twenty-fifth of their diameter, from ALE by about the same distance. Middle eyes very little closer to PLE than to ALE. Height of clypeus equal to nearly one third of diameter of AME. Clypeus decorated with simple white hairs which converge toward middle line and overlap there; three long bristles in lower angle between AME; a group of probably four long bristles beneath each AME convergent toward center; region beneath ALE also covered with appressed white hair, the continuation of the lateral stripes.

Chelicerae. Vertical, parallel, fairly robust; with basal segment .96 mm. long; slightly gibbous in front; with few long whitish hairs near base and near medial line. Fang short, moderately robust, evenly curved. Fang groove with two promarginal teeth, the more medial one small; retromargin with a single, simple, fairly robust tooth.

Maxillae. Parallel, longer than wide in middle in ratio of 3 : 1, deeply notched along outer border, notch with a distal border which ends in a blunt hook (Fig. 149), not much broadened not dilated distally.

Lip. Slightly longer than wide; excavations reach one third of its length, reaches to about middle of maxillae. Sternal suture gently procurved.

Sternum. Generally scutiform, widest between intervals separating second and third coxae, longer than wide in ratio of nearly 10 : 7, quite convex, thickly covered with whitish hair and colorless bristles; posterior end broad and blunt, not extended between fourth coxae which are separated by only one eleventh of their width.

Legs. 4312. Tibial index of first leg 17, of fourth leg 11.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
			(All measurements in millimeters)			
1.	1.60	.96	1.28	1.09	.65	5.58
2.	1.60	.96	1.15	.96	.64	5.31
3.	2.05	.89	1.28	1.60	.76	6.58
4.	1.92	.83	1.54	1.86	.77	6.92
Palp	.90	.38	.29	—	1.05	2.62

All coxae about equal in size. No fringes on any legs.

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral and retrolateral distal 2; patella only prolateral 0–1–0; tibia only prolateral and retrolateral 1–0–1–0, ventral 2–2–2; metatarsus only prolateral and retrolateral 0–0–1, ventral 0-2-2. Second leg: femur and patella as

in first except patella retrolateral 0–1–0; tibia same as in first except ventral 1r–2–2; metatarsus as in first. Third leg: femur and patella as in second; tibia dorsal 1–0–0, prolateral and retrolateral 1–1–1, ventral 1p–0–2; metatarsus only prolateral 1–0–2, retrolateral 1–1–2, ventral 0–2–2. Fourth leg: femur and patella as in third; tibia as in third except ventral 2–0–2; metatarsus as in third. Palpal spines: hypotype shows femoral dorsal spines 1–1–1, but some males show as many as five; most common number seems to be four.

Palp. Femur swollen dorsally and covered with a conspicuous white dorsal crest which continues dorsally over the patella less conspicuously; patella and tibia both short, the latter so lobed it is difficult to compare its length with that of the former; tibia with two processes, a prolateral, blunt, lightly chitinized process and a retrolateral, heavily chitinized apophysis, the two fitting on either side of a process from the cymbium (Fig. 150); bulb distinctly bilobed and massive, one lobe is much swollen and extends obliquely across from retrolateral to prolateral side, the other passes along retrolateral side from base to tip; embolus rises from tip of oblique lobe and passes as a long slender spine to tip of cymbium (Cambridge's Fig. 16b, Tab. 18). Tibia with whitish hairs.

Abdomen. Ovoid, longer than wide in ratio of 12 : 7, widest about two fifths from base, four dorsal sigilla make a quadrilateral figure wider behind than in front in ratio of 3 : 2, anal tubercle a short broad cone; spinnerets of moderate length, anterior pair most robust, posterior pair only a little slenderer, and middle pair slenderest of all and nearly hidden by others. Position of colulus indicated by a tuft of black bristles. Tracheal spiracle near base of spinnerets.

Color in alcohol. Palp as already described. Chelicerae dark reddish brown. Maxillae and lip brown streaked with darker brown, with whitish tips. Legs: coxae reddish brown streaked with darker brown; other segments reddish brown spotted and streaked with darker brown and with femora, patellae, tibiae, and, to some extent, metatarsi either completely or incompletely ringed broadly with loose white appressed hairs. Carapace: dark reddish brown with eyes on black spots; a central narrow white stripe from between PLE to beginning of posterior declivity; a white spot between PME and PLE; a broad marginal white stripe from posterolateral corner to AME. Abdomen: ground color dark brown but this is overlaid by dull greenish yellow and whitish hair as follows: whitish at base and this is continued as a lateral stripe on each side to anal tubercle; a narrow central whitish stripe which may or may not continue to anal tubercle; regions between lateral and

central whitish stripes are greenish yellow; when viewed dorsally, therefore, in well marked specimens there are five stripes visible, three whitish and two greenish yellow; venter almost black, central region bounded by two rows of small yellowish dots, extending through center overlying the dark ground color is a loose covering of whitish hairs and, in well colored specimens, making a central whitish stripe.

Type locality. Male hypotype from Canal Zone Biological Area, June, 1936; other males from the same locality, June–July, 1934; June–Aug., 1936; Aug., 1939; Jan.–Feb. ,1940 (Zetek); El Valle, R. P., July, 1936; Arraijan, R. P., Aug., 1936.

Freya demarcata Chamberlin and Ivie, 1936

Figures 151–153

Mr. Banks ('29) had one male from the Canal Zone Biological Area, July, 1924, which he identified as *F. rustica* (Peckham). The latter species has not been found in Panama. It is strongly suspected that this species is the male of *F. albosignata* (F. Cambridge).

Male hypotype. Total length 6.32 mm. Carapace 3.20 mm. long, 2.22 mm. wide just behind PLE which occupy almost the full width of carapace, 1.73 mm. tall and, therefore, somewhat more than three fourths as tall as wide; cephalic part rises gradually from AME to PLE and then descends more steeply to steep posterior declivity which begins about two thirds of the distance from PLE to posterior border but there is no great difference between the angle of descent of the posterior declivity and that part of the thorax immediately behind PLE; interocular area nearly flat, covered with a copious supply of black, white, and rust-red hairs as described later, numerous long black bristles in ocular area but none which seem to be especially noteworthy; PME and PLE on low tubercles.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one tenth of diameter of ALE. Anterior row wider than posterior row in ratio of 68 : 65. Quadrangle of laterals wider than long in ratio of about 34 : 21. Total eye space occupies about ten nineteenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 32 : 20 : 5 : 18. AME separated from one another by one thirty-second of the diameter of AME, from ALE by about the same distance. Middle eyes closer to PLE than to ALE in ratio of nearly 2 : 3. Height of clypeus equal to about three sixteenths of diameter of AME. Clypeus decorated with white hairs on lower two thirds and rust-red hairs filling in lower angle between

AME nearly surrounding all anterior eyes except for short arcs above and below AME which are provided with white hairs and also short arcs below ALE which also have white hairs; long white hairs cover basal half of chelicerae in front and extensions of marginal white stripe fill in space beneath ALE thus combining to give a very hirsute appearance to the species; three long stiff bristles as usual in lower angle between AME and several other long stiff bristles among white hairs.

Chelicerae. Vertical, parallel, robust; basal segment 1.09 mm. long; probably quite gibbous in front beneath white hairs; distal half with a scanty covering of whitish bristles; transversely rugulose. Fang moderately robust, evenly curved. Fang groove with two promarginal teeth near medial end, inner one small; a single, simple, fairly stout retromarginal tooth.

Maxillae. Parallel, longer than wide in middle in ratio of about 20 : 9; outer border quite deeply notched but with no tubercle or hook; outer distal corner somewhat truncated; as usual, with a well developed scopula along truncature.

Lip. Longer than wide in ratio of 23 : 20, basal excavations reach about one fourth of its length, reaches well beyond middle of maxillae. Sternal suture straight.

Sternum. Generally scutiform, longer than wide in ratio of about 11 : 7; quite convex opposite second and third coxae; widest between second coxae, almost as wide between third coxae; very blunt at posterior end and not extended between fourth coxae which are separated by only about one eleventh of their width.

Legs. 1342. Tibial index of first and fourth legs 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.09	1.34	1.90	1.47	.95	7.75
2.	1.75	.96	1.21	.95	.64	5.49
3.	2.11	1.02	1.28	1.47	.70	6.58
4.	1.92	.89	1.41	1.60	.75	6.57
Palp	.94	.32	.33	—	.96	2.55

No fringes on any legs.

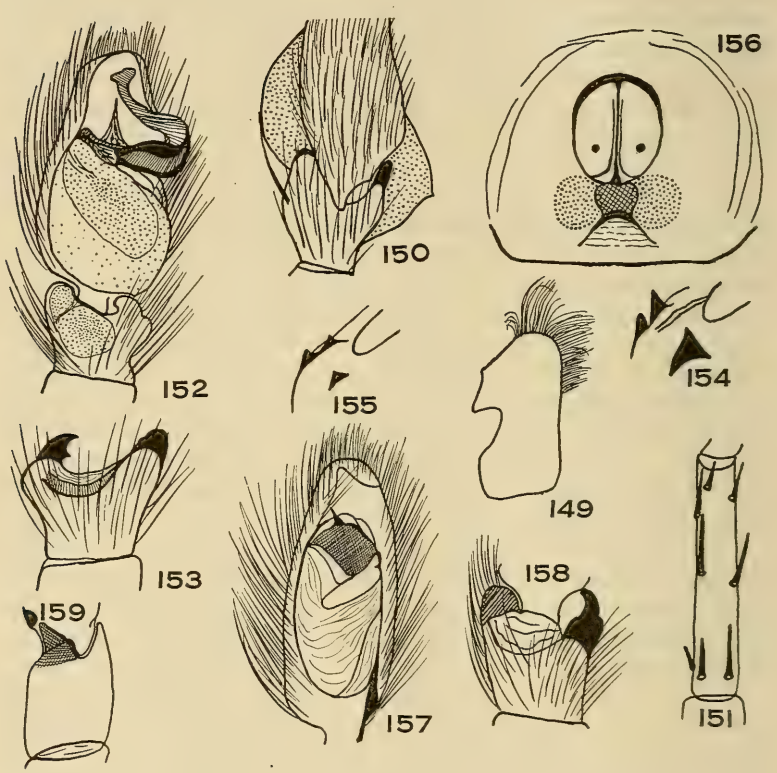
Spines. First leg: femur only dorsal 0–0–1–1–1, prolateral distal 2; patella only prolateral 0–1–0; tibia only prolateral 1–0–1, ventral 2–2–2 (staggered) (Fig. 151); metatarsus only ventral 2–2. Second leg: femur and patella as in first except femur retrolateral distal 1; tibia only prolateral 1–1–1, ventral 1r–2–2; metatarsus as in first. Third leg:

femur dorsal 0–1–1–1, prolateral 0–0–1–2, retrolateral 0–0–1–1; patella prolateral and retrolateral 0–1–0; tibia dorsal 1–0–0 (lacking on left), prolateral and retrolateral 1–1–1, ventral 0–1p-2; metatarsus only prolateral 1–0–2, retrolateral 1–1–2, ventral 2–2. Fourth leg: femur dorsal 0–0–1–1–1, prolateral and retrolateral distal 1; patella as in third; tibia as in third; metatarsus prolateral and retrolateral 1–1–2, ventral 0–2–2.

Palp. Femur not swollen, very gently arched dorsally; without white hairs except a few on retrolateral surface; tibia with a strongly chitinized prolateral distal lobe and a strongly chitinized robust retrolateral distal apophysis strongly geniculate toward base of cymbium and a deep ventral excavation; bulb swollen and also deeply excavated; tarsal spine (probably the embolus) very stout, completes a full turn of a loose spiral, considerably enlarged about one third from base and widened at its tip (Figs. 152–153).

Abdomen. Elongate ovoid; rather small and slender; longer than wide in ratio of about 2 : 1, widest about two fifths from base; with two pairs of dorsal sigilla making a quadrilateral figure wider behind than in front in ratio of about 6 : 5; well supplied with short stiff bristles and considerable brown and light colored hair. Anal tubercle a short cone covered dorsally with white hair. Spinnerets as usual in this group, with posterior pair well spread apart so as to expose to view the slender middle pair. Colulus indicated by a small tuft of bristles. Tracheal spiracle near base of spinnerets and guarded by a lightly chitinized lip.

Color in alcohol. Palp reddish brown and amber with femur streaked with black. Chelicerae a rich reddish brown, lighter around fang and fang groove. Maxillae and lip a deep amber color with yellowish white tips and lip streaked with black. Legs: first pair of coxae brownish and streaked with black, all others yellowish; first pair of tarsi yellowish, all other segments a rich dark shiny brown with some iridescence, especially on prolateral surfaces of femora and tibiae, light streaks dorsally on most segments; all other legs unicolorous light amber with considerable dark brown or black hair. Sternum with a brown anterior border, elsewhere light amber. Carapace: generally a rich dark reddish brown with eyes on black spots and many black streaks especially on lateral surfaces and on posterior declivity; a white central spot just behind AME, another white central spot over region of thoracic groove and a part of posterior declivity; a small white spot on each side between PME and PLE; a broad white marginal stripe on each side from posterolateral corner to clypeus where it joins the white of that region



External Anatomy of Spiders

Fig. 149. *Freya bulbosa*, male maxilla.
Fig. 150. *F. bulbosa*, male palpal tibia and part of tarsus, dorsal view.
Fig. 151. *Freya demarcata*, first tibia, ventral view.
Figs. 152–153. *F. demarcata*, male palp, ventral view, and palpal tibia, dorsal view.
Figs. 154–155. *Freya justina*, female and male cheliceral teeth.
Fig. 156. *F. justina*, epigynum, ventral view.
Figs. 157–159. *F. petrunkevitchi* Chickering; tarsus of male palp, ventral view; palpal tibia, ventral and retrolateral views.

and the base of the chelicerae; opposite PME an extension of the marginal stripe passes toward these eyes; bright rust-red hairs surround all eyes dorsally except as already noted. Abdomen: dark brown at base; this color extends laterally and is there broken into narrow stripes alternating with narrow yellowish stripes; dorsal to brown base is a narrow indefinite light bar which also extends dorsolaterally in broken and indefinite stripes to posterior end; extending through middle is a central dorsal indefinite light stripe containing a series of incomplete chevrons in its posterior half; on either side of this central light stripe is a broken brownish stripe with many yellowish dots; venter with a black central stripe containing two rows of yellowish dots and bounded laterally by yellowish areas mottled with black, but the ventral coloration is very variable in different specimens as, indeed, is the coloration of the whole abdomen.

Type locality. Male hypotype from Canal Zone Biological Area, July, 1939. Other males from: Canal Zone Biological Area, June–July, 1934; June–Aug., 1936; June–Aug., 1939; Ft. Randolph, C. Z., Aug., 1936; Arraijan, R. P., Aug., 1936; C. Z. Forest Reserve, C. Z., July–Aug., 1939.

Freya flava (F. Cambridge), 1901

Cyrene flava F. Cambridge, 1901
F. flava Petrunkevitch, 1911
F. flava Banks, 1929

This species was described from Guatemala entirely from females. Mr. Banks identified a female from Frijoles, C. Z., July, 1924, as belonging to this species. I have several females of the same species, but I have been compelled to regard them as a Phiale new to science. For this reason I consider that *F. flava* has not been collected in Panama.

Freya frontalis Banks, 1929

F. sagittifer Chamberlin and Ivie, 1936

Mr. Banks had several males from the Canal Zone Biological Area, July, 1924. Chamberlin and Ivie had a mature female and a single immature female. I have made a careful examination of both sexes with the conclusion that they can be safely matched in the way indicated. Hypotypes of both sexes should be carefully described. Many of both sexes are in my collection from the following localities: Canal

Zone Biological Area, June–July, 1934; July–Aug., 1936; June–Aug., 1939; Porto Bello, R. P., Aug., 1936; Frijoles, C. Z., Aug., 1936.

Freya grisea (F. Cambridge), 1901

Cyrene grisea F. Cambridge, 1901
F. grisea Simon, 1903
F. grisea Petrunkevitch, 1911
F. distincta Petrunkevitch, 1925

F. Cambridge reported this species from Guatemala and Panama. Professor Petrunkevitch described his species from the San Lorenzo River region of Panama. Cambridge's figures are good and, with the brief descriptive matter, I think identification is quite certain. Professor Petrunkevitch's description is very clear and detailed. From a careful study of both I feel quite certain of the synonymy as I have given it here. I have the species from the Canal Zone Biological Area, June–July, 1934; July–Aug., 1936; June–Sept., 1939.

Freya infuscata (F. Cambridge), 1901

Cyrene infuscata F. Cambridge, 1901
F. infuscata Petrunkevitch, 1911
F. infuscata Petrunkevitch, 1925

This species is known only from females, and it seems quite probable that it is the female of *F. grisea* (F. Cambridge). A decision on this point will have to await further study, however. The hypotype should be carefully described. I have the species only from the Canal Zone Biological Area, June–July, 1934; July, 1936; July–Aug., 1939; and the Canal Zone Forest Reserve, C. Z., July, 1939.

Freya justina Banks, 1929

Figures 154–156

Mr. Banks had one male from the Canal Zone Biological Area, July, 1924. I have many males and also several females which I believe can be safely matched with the males. One of the females has been selected and is herewith described as the allotype.

Female allotype. Total length 9.79 mm. Carapace 4.22 mm. long, 3.20 mm. wide at level of PLE which occupy about four fifths of width of carapace at that level, 1.98 mm. tall and, therefore, about five

eighths as tall as wide. PLE on low tubercles with a shallow depression between them. Carapace tallest at level of PLE. A short median longitudinal thoracic groove between posterior halves of PLE.

Eyes. Viewed from in front, anterior row recurved so that dorsal borders of ALE are slightly dorsal to those of AME. Anterior row equal in width to that of posterior row; wider than middle row in ratio of 40 : 33. Quadrangle of laterals wider than long in ratio of 40 : 27. Total eye space occupies thirty-three sixty-fourths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 35 : 20 : 5 : 18. AME separated from one another by about one eighteenth of their diameter, from ALE by twice that distance. Middle eyes slightly closer to PLE than to ALE. Height of clypeus about one fourth the diameter of AME. Clypeus decorated with simple white hairs which are longest along ventral margin and beneath outer borders of AME which are surrounded by a ring of white hairs. ALE also surrounded by white hairs except at outer upper sector where the hairs are reddish. Three long bristles in a triangle in lower angle between AME; other bristles along dorsal border of AME and lateral to ALE.

Chelicerae. Robust, very gibbous in front, parallel; with basal segment 1.30 mm. long. Fang moderately stout, evenly curved. Fang groove with two moderately stout promarginal teeth and a single, fairly stout retromarginal tooth (Fig. 154). A figure of the male cheliceral teeth is included for comparison (Fig. 155).

Maxillae. Parallel, longer than wide in middle in ratio of 19 : 8, moderately dilated distally. Palp inserted into basal two fifths. Outer distal corner with a reduced tubercle.

Lip. Longer than wide in ratio of about 4 : 3, somewhat tapered distally, basal excavations reach slightly more than one third of length, reaches a little beyond middle of maxillae. Sternal suture straight.

Sternum. Quite convex; well covered with slender bristles; longer than wide in ratio of 25 : 16, widest between second and third coxae; very blunt at posterior end which is not extended between fourth coxae which are only separated by three tenths of their width.

Legs. 4312. Tibial index of first leg 21, of fourth leg 11.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.11	1.41	1.66	1.30	.96	7.44
2.	2.11	1.32	1.35	1.20	.83	6.81
3.	2.69	1.34	1.60	1.60	1.02	8.25
4.	2.82	1.22	1.79	1.92	1.08	8.83

All legs with a moderate quantity of hair, but with no fringes.

Spines. First leg: femur dorsal 0–1–1–1, prolateral distal 2, elsewhere 0; patella only ventral 0–1r–0, lacking on left and may be aberrant; tibia only prolateral 1–0–1, ventral 2–2–2; metatarsus only ventral 2–2. Second leg: femur as in first except retrolateral 0–0–1–1 (both small and distal one lacking on left); patella 0; tibia and metatarsus as in first. Third leg: femur dorsal 0-1-0-1-1, prolateral 0–0–1–2, retrolateral only 1 distal; patella only prolateral and retrolateral 0–1–0; tibia only prolateral and retrolateral 1–1–1, ventral 0–1p–2; metatarsus prolateral 1–0–2, retrolateral 1–1–2, ventral 2–0–2. Fourth leg: femur only dorsal 0–1–0–1–1, retrolateral distal 1; patella only prolateral and retrolateral 0–1–0; tibia as in third; metatarsus prolateral and retrolateral 1–1–2, ventral 2–0–2. Palpal spines: only femur dorsal distal 1.

Abdomen. Ovoid, longer than wide in ratio of 79 : 44, widest about three eighths from base from which place it tapers to a blunt point at base of spinnerets; anal tubercle a short broad cone; spinnerets of moderate length, all rather slender, first pair somewhat the stoutest, middle pair somewhat the slenderest and slightly the shortest, posterior pair spread so that middle pair is exposed to view; position of colulus indicated by a tuft of dark hairs. Tracheal spiracle near base of spinnerets and with a slightly chitinized lip but with no distinct tubercle.

Epigynum. A short distance anterior to genital groove is a central opening into a strongly chitinized bursa on each side of which is a fairly large circular spermatheca. Immediately anterior to these parts is a large central oval cavity divided by a low septum (Fig. 156).

Color in alcohol. Much lighter in color than most males. Carapace: eyes on very dark brown spots, more or less connected; a yellowish white central stripe extends from median thoracic groove to posterior border, anteriorly the stripe extends forward somewhat indefinitely as far as middle eyes; interocular area generally a light reddish brown; the central interocular light reddish brown area extends on each side along dorsolateral region to posterior border where it is narrowed; laterally carapace is yellowish white spotted with reddish brown; a narrow dark marginal stripe extends all the way around the carapace from opposite ALE. Sternum: light yellowish. Lip and maxillae a light amber. Chelicerae a much darker amber. Palp: yellowish with a faint basal annulation on terminal three segments; tarsus much darker. All legs yellowish beneath, yellowish with brown bars dorsally. Abdomen: yellowish white at base, also laterally but much speckled with light brown; a light central median stripe more or less indented marginally and con-

taining small reddish brown spots anteriorly and faint chevrons posteriorly; on each side of central light stripe is a broken broad reddish brown stripe much spotted with yellowish white; venter yellowish white with small dark spots which unite into a large dark spot anterior to tracheal spiracle.

Type locality. Female allotype from Canal Zone Biological Area, June, 1939. Males and females from the following localities: Canal Zone Biological Area, June–July, 1934; June–Aug., 1936, 1939; El Valle, R. P., July, 1936; Ft. Randolph, C. Z., Aug., 1936; Ft. Sherman and France Field, C. Z., Aug., 1939.

Freya longispina (F. Cambridge),1901

Cyrene longispina F. Cambridge, 1901
F. longispina Simon, 1903
F. longispina Petrunkevitch, 1911
F. longispina Petrunkevitch, 1925

The male was originally described from Guatemala and the female is not yet known. Professor Petrunkevitch reported the species from Panama ('25) and described the male. I have one specimen from the Canal Zone Forest Reserve, C. Z., July, 1939. It is about the same size as *F. bifurcata,* does not have the white hairs on the clypeus, but it has a white fringe on the palpal femur and patella. The spination differs somewhat from that recorded by Petrunkevitch.

Freya minuta (F. Cambridge), 1901

Cyrene minuta F. Cambridge, 1901
F. minuta Petrunkevitch, 1911
F. minuta Petrunkevitch, 1925

This is another species which has not yet appeared in my collection. Only the male is known.

Freya petrunkevitchi, spec. nov.

Figures 157–159

Male holotype. Total length 6.46 mm. Carapace 2.53 mm. long, 2.11 mm. wide at level of PLE which occupy about ten elevenths of width of carapace at their level; 1.66 mm. tall and, therefore, about sixteen twenty-firsts as tall as wide; with usual form of genus.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one sixth of the diameter of ALE. Anterior row only slightly wider than posterior row, wider than middle row in ratio of 17 : 15. Quadrangle of laterals wider than long in ratio of 17 : 11. Total eye space occupies just slightly more than half the length of carapace. Ratio of eyes AME : ALE : PME : PLE=32 : 19 : 5 : 16. AME practically contiguous, separated from ALE by one fifteenth of their diameter. Middle eyes slightly closer to PLE than to ALE. Height of clypeus equal to about one third of diameter of AME. Clypeus decorated with a ventral white fringe but the white hairs are not spread over clypeus as in so many of the genus, also a patch of white hairs beneath each ALE.

Chelicerae. Vertical, parallel; anterior surface rugulose, supplied with a sparse covering of white hairs; moderately robust; basal segment .96 mm. long. Fang moderately robust, evenly curved. Fang groove with two promarginal teeth, the more medial the smaller; a single, fairly stout, retromarginal tooth.

Maxillae. Parallel, longer than wide in middle in ratio of about 2 : 1. Not strongly constricted in middle; with palp inserted into basal half, with outer angle well rounded.

Lip. Longer than wide in ratio of 12 : 11; basal excavations reach only about one fourth the length of the organ; reaches a little beyond middle of maxillae. Sternal suture gently procurved.

Sternum. Elongate scutiform; longer than wide in ratio of 55 : 38, widest between second coxae; very blunt at posterior end but not extended between fourth coxae which are separated only by about one twelfth of their diameter.

Legs. 1432. Tibial index of first leg 16, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.18	1.26	1.85	1.41	.90	7.60
2.	1.73	.97	1.20	1.00	.74	5.64
3.	1.82	1.00	1.28	1.40	.75	6.25
4.	1.79	.84	1.40	1.60	.80	6.43
Palp	.89	.40	.39	—	.80	2.45

No definite fringes on legs or palpi.

Spines. First leg: femur only dorsal 0–1–1–1, prolateral distal 2; patella 0; tibia only prolateral 0–0–1, ventral 2–2(promarginal is offest prolaterally)–2; metatarsus only ventral 2–2. Second leg: femur as in

first except retrolateral distal 1; patella prolateral 0–1(small)–0; tibia only prolateral 1–0–1, ventral 1r–2–2; metatarsus only ventral 2–2. Third leg: femur dorsal 0–1–1–1, prolateral 0–1–2, retrolateral distal 1; patella prolateral and retrolateral 0–1–0; tibia prolateral and retrolateral 1–1–1, ventral 1p–0–2; metatarsus prolateral 1–2, retrolateral 1–1–2, ventral 2–2. Fourth leg: femur dorsal 0–1–1–1, retrolateral distal 1; patella only retrolateral 0–1–0; tibia prolateral and retrolateral 1–1–1, ventral 0–1p–2; metatarsus prolateral and retrolateral 1–1–2, ventral 2–2. Palpal spines: one dorsal distal femoral.

Palp. Both patella and tibia short and almost exactly equal in length. Tibial retrolateral apophysis much like that in *F. grisea* and *F. arraijanica;* distal part turned sharply toward the tarsus and with a groove separating it from basal part. Tarsus unlike any known to me; very simple, with a very small spine-like embolus extending from anterior end of bulb (Figs. 157–159).

Abdomen· Elongate ovoid, longer than wide in ratio of 50 : 27, widest three tenths from base; with two pairs of dorsal sigilla making a quadrilateral figure wider behind than in front in ratio of about 11 : 9; well supplied with light and dark hair and both long and short recurved bristles. Anal tubercle, as usual, a broad flattened cone. Position of colulus indicated by a small tuft of dark hairs. Tracheal spiracle close to base of spinnerets, not provided with a tubercle.

Color in alcohol. Carapace generally a reddish brown with many black intercommunicating lines; eyes on black spots with interocular area much lighter brown; scattered white hairs occur generally all over carapace with clypeus as already noted, also an inconspicuous white patch dorsal to AME; beginning at thoracic groove there is a light stripe which continues nearly to posterior border; also a few rust-red hairs around eyes. Sternum a light amber with a narrow darker border. First pair of legs and palps a dark brown, lighter dorsally and with many fine black lines; all other legs light amber. Abdomen: a dark brown patch at base extends along lateral sides to posterior end; a transverse yellowish bar just dorsal to the dark patch extends dorsolaterally toward posterior end but narrows and disappears about one fourth from base; extending throughout central region is a broad, deeply indented yellowish stripe on each side of which is a fairly broad brownish stripe; venter is yellowish white mottled with dark brown spots which tend to unite centrally.

Type locality. Male holotype from Canal Zone Biological Area, August, 1939. No paratypes.

Freya prominens (F. Cambridge), 1901

Cyrene prominens F. Cambridge, 1901
F. prominens Simon, 1903
F. prominens Petrunkevitch, 1911
F. prominens Banks, 1929

F. Cambridge's figures of the male palp are good but it seems probable that he made his figure of the epigynum from an immature female. He stated that: "The carapace is clothed with yellowish-grey hairs and has a pale central posterior groundline but no band of white hairs". Apparently reference is made to the absence of the median longitudinal white stripe because there are lateral white stripes in both sexes, although his figure of the female does not show them. Originally reported from Mexico and Costa Rica. Mr. Banks collected a male and two females in the Canal Zone Biological Area, July, 1924. I have the species represented by both sexes from the following localities: Canal Zone Biological Area, July–Aug., 1936; July–Aug., 1939; Chilibre, C. Z., Aug., 1939.

Freya striata spec. nov.

Figures 160–162

Male holotype. Total length 3.01 mm. Carapace 1.53 mm. long, 1.09 mm. wide a short distance behind PLE which occupy a little less than the full width of the carapace at their level, .78 mm. tall and, therefore, about .71 as tall as wide; ascent very gradual from AME to PLE, then descent gradual to beginning of steep posterior declivity which occurs about ten twenty-sevenths of the distance from PLE to posterior border; lateral sides almost parallel and vertical to a short distance behind PLE; with a short longitudinal medial thoracic groove a short distance behind PLE.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of ALE are slightly above those of AME. Anterior and posterior rows equal in width, both wider than middle row in ratio of 47 : 43. Quadrangle of laterals wider than long in ratio of 47 : 35. Total eye space occupies four sevenths of the length of carapace. Ratio of eyes AME : ALE : PME : PLE = 17 : 8.5 : 2.3 : 9. AME almost contiguous with one another, separated from ALE by one sixteenth of their diameter. Middle eyes closer to PLE than to ALE in ratio of about 8 : 11. Height of clypeus equal to one fourth the diameter of AME. Clypeus decorated only with a weak fringe of ventral brownish bristles,

one long brownish bristle beneath outer border of each AME, and three long upturned bristles in lower angle between AME.

Chelicerae. Vertical, essentially parallel; swollen in a broad ridge obliquely from inner basal corner to middle of outer border; basal segment .45 mm. long. Fang quite irregular, a low ridge or tubercle about two fifths from base indicates the position of an obsolescent tooth. Fang groove distinct; promargin with a strongly chitinized low ridge near medial end upon which two (possibly three) small teeth occur; retromargin with a single simple tooth about one fourth from medial end of groove.

Maxillae. Essentially parallel, longer than wide in middle in ratio of about 2 : 1, considerably broadened distally because outer distal angle is drawn out laterally, outer distal corner distinctly angular but without any tubercle or hook, scopula along truncature fairly well developed.

Lip. Wider than long in ratio of 11 : 9, reaches to about middle of maxillae, basal excavations reach a little less than one third the length of the organ. Sternal suture gently procurved.

Sternum. Scutiform; longer than wide in ratio of 30 : 23, widest between second coxae; very convex, especially between third coxae; anterior border only slightly wider than base of lip; posterior end a blunt point not extended between fourth coxae which are separated by about one fourth of their diameter.

Legs. 4123. Tibial index of first leg 17, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.02	.45	.70	.58	.41	3.16
2.	.77	.45	.57	.47	.35	2.61
3.	.79	.35	.46	.65	.35	2.60
4.	.96	.45	.75	.83	.38	3.37
Palp	.50	.19	.14	—	.45	1.28

All legs with a moderate supply of hair, but with no conspicuous special fringes.

Spines. First leg: femur only dorsal 1–1–1 observed; patella 0; tibia only prolateral 0–0–1–0, ventral 2–2–2 (last pair not terminal and not well matched); metatarsus only ventral 2–2 (all very long, at least half as long as segment). Second leg: femur dorsal 1–1–1, prolateral distal 1; patella 0; tibia only prolateral 0–1–1–0, ventral 1r–1r–2; metatarsus only ventral 2–2. Third leg: femur dorsal 1–1–1, prolateral and retrolateral distal 1; patella 0; tibia prolateral and retrolateral

0–1–1–0, ventral 0–1p–0–2; metatarsus prolateral 0–0–2, retrolateral 0–1–1, ventral 0. Fourth leg: femur and patella as in third leg; tibia prolateral 0–1–1, retrolateral 0–0–1, ventral 0–1p–0–2; metatarsus prolateral 0–0–2, retrolateral 0–1–2, ventral 0. Palpal spines: apparently only femur dorsal 1–1–1, long and slender, hardly more than stout bristles.

Palp. Without fringes or special decorations; femur moderately bent ventrally; patella and tibia both short with latter little more than two thirds as long as former; tibial retrolateral apophysis a very short spur directed ventrally; bulb moderately swollen and overlapping tibia quite extensively; embolus arises on prolateral side of bulb not far from middle and extends distally as a straight pointed spine (Figs. 160–161).

Abdomen. Nearly oval in outline; longer than wide in ratio of 24 : 15, widest in middle; anal tubercle a short flattened cone; spinnerets with posterior pair slender, longest, and spread out so that middle pair is visible from above, anterior pair most robust and approximated at bases; vestigial colulus indicated by a small group of stiff black hairs; tracheal spiracle near base of spinnerets, with a distinct lip but no tubercle.

Color in alcohol. Carapace: generally reddish brown; with eyes on black spots and with interocular area dark brown; a lighter central dorsal stripe begins between PLE and extends to posterior border; on each side of this lighter stripe is a region with nearly black streaks; ventral margin with dark stripe having an indefinite dorsal border. Palp dark brown with distal third or cymbium yellowish white. Chelicerae dark brown, lighter along fang groove. Maxillae and lip brown with yellowish white tips. Sternum and coxae yellowish white except first pair of coxae which are brown prolaterally and retrolaterally. Legs: first pair dark brown with tarsi yellowish white; patellae much lighter in distal half; also with distal halves of patellae and distal ends of tibiae supplied with patches of white lanceolate hairs on prolateral sides; first femora highly polished on prolateral surface where there is much iridescence; all other legs light brownish dusted with dark brown. Abdomen: a narrow central dorsal dark brown stripe has a yellowish white stripe on each side of it, further laterally is another broader brown stripe poorly separated from lateral regions; viewed dorsally, therefore, there are five abdominal stripes, three brown and two whitish ones; laterally dotted brown and yellowish white; venter yellowish white with occasional brown dots and a narrow black line across at level of tracheal spiracle.

Female allotype. Total length 3.52 mm. Carapace 1.60 mm. long, 1.12 mm. wide at level of PLE which occupy the full width of the carapace at their level, .73 mm. tall and, therefore, .65 as tall as wide. Otherwise essentially as in male.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of AME are slightly above those of ALE. Quadrangle of laterals wider than long in ratio of about 10 : 7. Ratio of eyes AME : ALE : PME : PLE = 17 : 9 : 2 : 9. AME almost contiguous to one another and to ALE. Middle eyes closer to PLE than to ALE in ratio of 4 : 5. Clypeus practically obsolete. Otherwise as in male.

Chelicerae. Basal segment .38 mm. long. Otherwise essentially as in male, except the outstanding features are somewhat toned down in female. Fang fairly robust in basal two fifths, remainder slender and evenly curved. Fang groove plainly with two promarginal teeth and retromargin with a single simple tooth.

Maxillae. Essentially as in male except not broadened distally as in that sex, outer distal corner smoothly rounded, not angular.

Lip and *Sternum.* Essentially as in male. Posterior coxae more nearly contiguous than in male, being separated by only one sixth of their width.

Legs. 4132. Tibial index of first leg 15, of fourth leg 11.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.83	.51	.58	.45	.32	2.69
2.	.67	.38	.45	.38	.32	2.20
3.	.70	.38	.45	.58	.38	2.49
4.	.96	.45	.70	.70	.41	3.22

Spines. First leg: femur dorsal 0–1–1–0; patella 0; tibia only ventral 2–2–2 (last pair not terminal); metatarsus only ventral 2–2. Second leg: as in first except tibia prolateral 0–0–1, ventral 1r–2–2. Third leg: femur dorsal 1–1–1, patella 0; tibia prolateral 0–1–0; ventral 0–0–1p (not terminal); metatarsus prolateral 0–2, retrolateral 1–2, ventral 0–1. Fourth leg: femur and patella as in third; tibia prolateral 0–1–0, ventral 1p–0–1p (terminal); metatarsus as in third. Palpal spines: none observed.

Abdomen. Longer than wide in ratio of about 2 : 1. Otherwise essentially as in male.

Epigynum. Simple; without any posterior marginal notch; with what appear to be two large, somewhat quadrilateral spermathecae just in front of posterior margin; anterior half of epigynal plate with a

low median longitudinal septum separating two minute openings (Fig. 162).

Color in alcohol. Almost identical with that of male. Front legs and carapace somewhat lighter than in male. Palpus yellowish white. Dorsal abdominal stripes somewhat less definite, especially the dorsolateral brownish stripes.

Type locality. Male holotype and female allotype from Canal Zone Forest Reserve, C. Z., July, 1939. Paratypes of both sexes from the following localities: Canal Zone Biological Area, June–July, 1934; Aug., 1939; Ft. Sherman, C. Z., Aug., 1939; Canal Zone Forest Reserve, July, 1939.

Gorgasella gen. nov.

Carapace rather high, fairly broad, with lateral sides considerably rounded; dorsal surface gently arched from AME to steep posterior declivity which begins a little less than half way from PLE to posterior border and is not concave; widest just behind PLE; with a slender median longitudinal thoracic groove a short distance behind PLE. *Eyes:* anterior row rather strongly recurved; PME slightly closer to ALE than to PLE; PLE occupy nearly three quarters of width of carapace; anterior and posterior rows about equal in width; quadrangle of laterals much wider than long; total eye space occupies a little more than half the length of carapace. *Clypeus* rather low. *Chelicerae* robust, essentially parallel; distinct fang groove with a typical retromarginal fissidentate tooth. *Maxillae* slightly convergent, unmodified. *Sternum* scutiform, broad, widest between second coxae, but nearly as wide between first coxae. *Legs:* 4312; all legs fairly robust; without fringes or special tufts of hair; leg spines numerous and well developed; first tibiae with four pairs of robust ventral spines. *Abdomen* ovoid, fairly stout. *Genotype: Gorgasella eximia* sp. nov.

Gorgasella eximia spec. nov.

Figures 163–167

Female holotype. Total length 5.37 mm. Carapace 2.43 mm. long, 1.79 mm. wide a short distance behind PLE which occupy seventeen twentieths of width of carapace; 1.28 mm. tall and, therefore, .72 as tall as wide; ascent from AME to PLE very gradual, flat between PLE descent from PLE very gradual to beginning of steep posterior decliv-

ity which occurs shortly before the middle of the distance from PLE to posterior border; laterally the full width is obtained immediately behind ALE where there is a distinct fullness; with a slender median longitudinal thoracic groove of moderate length beginning just a short distance behind PLE; hair very sparsely distributed over carapace; stiff bristles especially numerous on region from PLE to steep declivity and even involving the upper third of the declivity itself (Figs. 163–164).

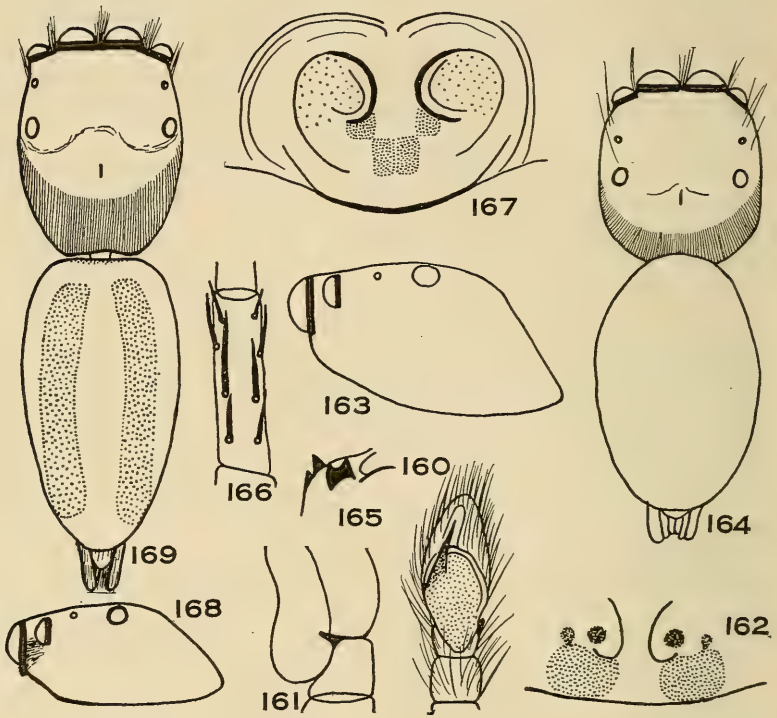
Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one sixth of the diameter of ALE. Anterior row wider than posterior row in ratio of 24 : 23, wider than middle row in ratio of 8 : 7. Quadrangle of laterals wider than long in ratio of 3 : 2. Total eye space occupies about four sevenths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 23 : 12.5 : 2.75 : 11. AME separated from one another by one twelfth of their diameter, from ALE by slightly less than this distance. Middle eyes closer to PLE than to ALE in ratio of about 11 : 13. Height of clypeus equal to five twenty-thirds of the diameter of AME. Clypeus decorated with a weakly developed ventral fringe of ordinary bristles, a row of long whitish hairs, and three long upturned whitish bristles in lower angle between AME.

Chelicerae. Robust, strongly swollen in front with outer border convex; transversely rugulose in front; basal segment 1.02 mm. long. Fang robust, evenly curved. Fang groove distinct; promargin with two teeth set close together at medial end of groove; retromargin with a typical fissidentate tooth about the middle (Fig. 165).

Maxillae. Slightly convergent, longer than wide in middle in ratio of 30 : 19, only moderately concave in middle of outer border; distal border rounded; outer distal corner smoothly rounded without tubercle or hook; with a rather poorly developed scopula along truncature.

Lip. As long as wide; basal excavations reach slightly less than one third length of organ; reaches about two thirds the length of the maxillae; distal border well rounded and much narrower than base. Sternal suture slightly procurved.

Sternum. Scutiform; longer than wide in ratio of 50 : 37; widest between second coxae but nearly as wide between first coxae; anterior border as wide as base of lip; anterior coxae separated by three quarters of the greatest width of the sternum; posterior end blunt and not extended between fourth coxae which are separated by about one fourth of their diameter. Second coxae distinctly separated by a considerable space from third coxae.



External Anatomy of Spiders

Figs. 160–161. *Freya striata* Chickering; male palp, ventral view, and palpal tibia, retrolateral view.

Fig. 162. *F. striata* Chickering; epigynum, ventral view.

Figs. 163–164. *Gorgasella eximia* Chickering; carapace, lateral view, and body, dorsal view.

Fig. 165. *G. eximia* Chickering; female cheliceral teeth.

Fig. 166. *G. eximia* Chickering; first tibia, ventral view.

Fig. 167. *G. eximia* Chickering; epigynum, ventral view.

Figs. 168–169. *Monaga benigna* Chickering; carapace, lateral view, and body, dorsal view.

Legs. 4312. Tibial index of first leg 19, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.34	.83	.90	.82	.48	4.37
2.	1.28	.70	.78	.77	.45	3.98
3.	1.47	.76	.89	1.02	.51	4.65
4.	1.60	.76	1.15	1.22	.51	5.24

All legs with a moderate supply of simple hair, but with no fringes or special tufts. Palps with much yellowish hair especially on tibiae and tarsi, with fringe heavily developed on prolateral side of tarsi; tarsi heavily chitinized and somewhat flattened dorsoventrally.

Spines. First leg: femur dorsal 0–1–1–1, prolateral distal 2; patella 0; tibia only prolateral 0–1–0, ventral 2–2–2–2 (third pair offset laterally somewhat, Fig. 166); metatarsus prolateral and retrolateral 1–1, ventral 2–2 (first pair very long). Second leg: femur and patella as in first; tibia prolateral 0–1–1 on left side, 0–0–1 on right, retrolateral 0 on left, 0–0–1 on right, ventral 2–2–1r–2; metatarsus as in first. Third leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 1; patella 0; tibia prolateral and retrolateral 0–1–1, ventral 0; metatarsus prolateral 1r–2, retrolateral 1–1–2, ventral 2–2. Fourth leg: femur as in third; patella only retrolateral 0–1–0; tibia prolateral 0–0–1, retrolateral 0–1–1, ventral 0–0–1r; metatarsus prolateral 0–1–2, retrolateral 1–1–2, ventral 0–1r. No palpal spines observed.

Abdomen. Nearly oval in outline; 3.07 mm. long; longer than wide in ratio of nearly 3 : 2; widest about the middle; anal tubercle a short cone with a tuft of white hairs; six spinnerets of moderate size and length, without special features; position of colulus indicated by a tuft of black hairs; tracheal spiracle near base of spinnerets, with an obscure lip but no tubercle.

Epigynum. Quite conspicuous and well chitinized; plate wider than long in ratio of about 3 : 2; posterior margin with a heavily chitinized lip but no marginal notch; in anterior half of plate are two white areas separated by a low septum and surrounded by well chitinized margins (Fig. 167).

Color in alcohol. Carapace: generally a rich dark brown with many black streaks; eyes on black spots; with many slender white hairs which are easily rubbed off. Palps yellowish white with tarsi light amber. Chelicerae dark reddish brown; lip and maxillae similar with whitish tips. All legs yellowish below and light amber above with variations; anterior tibiae faintly brownish in basal third. Abdomen:

black base extends along lateral sides to posterior end with very narrow elongated yellowish spots; dorsum with a yellowish white basal band which extends dorsolaterally as a narrow stripe on each side for about two fifths of the length of the abdomen; centrally are two pairs of yellowish white spots over the muscle impressions and behind these are two pairs of rather short white bars; all other areas black; venter a clear yellowish white.

Type locality. Female holotype from Canal Zone Biological Area, Aug., 1936. No paratypes.

Monaga gen. nov.

Carapace moderately high, moderately broad; widest in region of PLE; lateral sides gently rounded; dorsal surface gently arched from AME to steep posterior declivity which begins about two fifths of the distance from PLE to posterior margin; a short median longitudinal thoracic groove about half way from PLE to posterior declivity. *Eyes:* anterior row moderately recurved; PME somewhat closer to ALE than to PLE; PLE occupy nearly full width of carapace; posterior row slightly wider than anterior row; quadrangle of laterals considerably wider than long; total eye space occupies about one half the length of the carapace. *Clypeus* rather low. *Chelicerae* fairly robust; somewhat porrect; parallel; distinct fang groove with a single fairly robust retromarginal tooth (seems to show some tendency toward fissidentate type). *Maxillae* parallel, unmodified. *Sternum* elongate scutiform; moderately broad; moderately convex; only moderately narrowed between first coxae. *Legs:* 4132; first pair considerably enlarged; all legs with a moderate supply of hair and probably the remains of a fringe on anterior patellae and tibiae; leg spines considerably reduced in number. *Abdomen* elongate ovoid. *Spinnerets* of moderate size. *Genotype: Monaga benigna* sp. nov.

Monaga benigna spec. nov.

Figures 168–171

The genus Monaga and this species are placed here tentatively. Its correct position is not at all clear.

Female holotype. Total length 4.67 mm. Carapace 1.96 mm. long, 1.38 mm. wide a short distance behind PLE which occupy fifteen sixteenths of the width of the carapace at their level, .90 mm. tall and,

therefore, .65 as tall as wide; gently arched dorsally from AME to steep posterior declivity which begins about two fifths of the distance from PLE to posterior border; lateral sides of cephalic part vertical and only gently rounded from ALE to posterolateral angles; with a short median longitudinal thoracic groove a little less than half way from PLE to beginning of steep posterior declivity (Figs. 168–169).

Eyes. Seen from in front, anterior row recurved so that dorsal borders of ALE are slightly below those of AME. Posterior row wider than anterior row in ratio of 61 : 57, wider than middle row in ratio of 61 : 52. Quadrangle of laterals wider than long in ratio of 61 : 38. Total eye space occupies about nine seventeenths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 19 : 9.5 : 2 : 8.5. AME separated from one another and from ALE by one nineteenth of the diameter of AME. Middle eyes closer to ALE than to PLE in ratio of 10 : 13. Clypeus decorated with a fringe of white lanceolate hair, a single long yellowish bristle beneath outer boundary of each AME, and three long upturned yellowish bristles in lower angle between AME, the single upper one very long, the two lower much shorter. Height of clypeus equal to one ninth of the diameter of AME.

Chelicerae. Rather robust, somewhat porrect, parallel; strongly swollen in front from near base obliquely from medial side to outer distal corner; with well developed basal boss; somewhat excavated medially in distal half; basal segment .63 mm. long. Fang moderately robust, somewhat irregular along outer surface in basal half, elsewhere evenly curved. Fang groove distinct; with two small promarginal teeth near medial end of groove; retromargin with a single fairly robust tooth which seems to show a slight tendency toward fissidentate condition.

Maxillae. Parallel, longer than wide in middle in ratio of about 25 : 13; only slightly concave along middle of outer border; outer distal corner well rounded with no tubercle or hook; with a well developed scopula along truncature.

Lip. Longer than wide in ratio of 4 : 3, basal excavations reach slightly more than one third of the length of the organ, reaches slightly beyond middle of maxillae. Sternal suture straight.

Sternum. Elongate scutiform, longer than wide in ratio of 5 : 3; moderately convex, especially in posterior half; anterior border about nine thirteenths as wide as base of lip; anterior coxae separated by eleven twenty-fourths of the greatest width of the sternum; posterior end bluntly rounded and not extended between fourth coxae which are separated only by about one sixth of their diameter.

Legs. 4132. Tibial index of first leg 22, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.09	.64	.83	.70	.41	3.67
2.	.90	.54	.58	.58	.35	2.95
3.	.96	.51	.58	.62	.38	3.05
4.	1.22	.58	.90	.83	.41	3.94

First leg considerably enlarged (Fig. 170), with what might be considered the remains of a ventral fringe on patellae and tibiae. Other legs with a moderate amount of ordinary hair.

Spines. First leg: femur dorsal 0–1–1–1, prolateral distal 2; patella only prolateral 0–1–0; tibia only ventral 2–2–2–2; metatarsus only ventral 0–2–2. Second leg: femur dorsal 0–1–1–1, prolateral only distal 1; patella 0; tibia prolateral 0–0–1–0, ventral 1r–1r–2; metatarsus only ventral 0–2–2. Third leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 1; patella 0; tibia prolateral and retrolateral 0–0–1–0, ventral 0–0–2; metatarsus prolateral 0–1, ventral 0–2. Fourth leg: femur and patella as in third; tibia only ventral 0–0–1p; metatarsus prolateral and retrolateral 0–1, ventral 0–1. Palpal spines: apparently only femur dorsal 0–0–1.

Abdomen. 2.75 mm. long; longer than wide in ratio of 43 : 23; widest just before the middle; anal tubercle a rather prominent cone with a terminal tuft of white hair; six spinnerets of moderate length and size, closely crowded; position of colulus uncertain; tracheal spiracle at base of spinnerets, with obscure lip but no tubercle

Epigynum. Simple; with a deep posterior marginal notch from lateral sides of which tubules protrude; anterior half definitely bounded by a strongly recurved boundary at posterior ends of which is a pair of small openings (Fig. 171).

Color in alcohol. Carapace: reddish brown with eyes on black spots; white lanceolate hairs in a patch beneath ALE, weakly distributed along ventral margin and arranged in a narrow recurved bar behind PLE (all of these are very incomplete because of the rubbing to which the specimen has been subjected); all parts except interocular area with dark brown streaks. Palps yellowish white except tarsi and tibiae which are light brown. Chelicerae reddish brown; maxillae the same with whitish tips. Sternum brown with many yellowish and dark brown dots. Lip brownish with many light and dark streaks. Legs: first pair reddish brown with tarsi yellowish and femora with many short loose white lanceolate hairs; other legs light brownish dorsally with variations, yellowish white ventrally and in basal half of femora. Abdomen: yellowish white with a pair of dorsal reddish brown stripes

(Fig. 169); dark brownish at base with this color extending laterally as a stripe of moderate width to spinnerets; venter with three faint dark brown stripes from genital groove to region of tracheal spiracle where they unite with a brownish bar; spinnerets almost black.

Type locality. Female holotype from Canal Zone Biological Area, July, 1934. No paratypes.

Genus Phiale C. Koch, 1850

Petrunkevitch ('25) listed eleven species of the genus Phiale believed to occur in Panama. *Phiale mimica* (C. Koch) is a synonym of *P. gratiosa* C. Koch. As already pointed out, *F. bilobata* (F. Cambridge) is to be added to the genus. Banks ('29) reported six species from the vicinity of the Canal Zone. The spiders identified by him as *P. geminata* (F. Cambridge) are a mixture. The males are *Freya demarcata* Chamberlin and Ivie, the females *F. albosignata* (F. Cambridge). *P. magnifica* (Banks) and *P. dybowskii* (Taczanowski) had not previously been reported from Panama. I am compelled to consider *P. lineola* Chamberlin and Ivie the same as *P. dybowskii* (Taczanowski). In my study of Phiale from Panama I have found it necessary to describe four new species. Hence at this time we know nineteen species of the genus from that country. They may be listed as follows: *P. aliceae* sp. nov., *P. bicuspidata* (F. Cambridge), *P. bilobata* (F. Cambridge), *P. delecta* (Peckham), *P. donaldi* sp. nov., *P. dybowskii* (Taczanowski), *P. elegans* (F. Cambridge), *P. flavescens* (Peckham), *P. geminata* (F. Cambridge), *P. interrupta* (F. Cambridge), *P. maculosa* sp. nov., *P. magnifica* (Banks), *P. mimica* (C. Koch), *P. niveo-guttata* (F. Cambridge), *P. orvillei* sp .nov., *P. pallida* (F. Cambridge), *P. panamae* Chamberlin, *P. pratensis* (Peckham), *P. simplicicava* (F. Cambridge).

Key to the species of Phiale from Panama

Males

1. Carapace: dark brown with a moderately broad white marginal stripe, a small white patch between ALE, a short white stripe between PLE to posterior declivity; clypeus and base of chelicerae with few white hairs. Abdomen: with a narrow white basal band extending laterally; nearly whole dorsum bright rust-red. Palp: femur deepened dorsoventrally, with a white crest; tibial apophysis broad, deeply excavated dorsally; bulb distinctly bilobed at base; embolus accompanied by a slender, hooked process
P. aliceae, (p. 205)

1. Not with combination of characters given above 2
2. Carapace: reddish brown with a broad marginal white stripe extended dorsally between PME and PLE; with a patch of white hair between ALE and a sagittate white stripe from thoracic groove half way to posterior border; clypeus and basal half of chelicerae with a brush of simple white hair. Abdomen: yellowish with a pair of broken brownish dorsal stripes. Palp: femur not notably modified; without a definite white crest; tibial apophysis conspicuously divided into two processes; embolus a short, very slender filament at anterior end of bulb ..... *P. bicuspidata*, (p. 207)
2. Not with combination of characters given above 3
3. Carapace: very dark brown with a narrow white marginal stripe to opposite PME; several small white patches in ocular area; clypeus and base of chelicerae with few whitish hairs. Abdomen: with a white basal band extending dorsolaterally; a central narrow light stripe between two broad rust-red stripes. Palp: femur not notably modified, with a snow white dorsal crest; tibial apophysis somewhat flattened, beak-like; bulb distinctly bilobed at base, lobules well separated; embolus a very short pointed anterior spine ..... *P. bilobata*, (p. 208)
3. Not with combination of characters given above 4
4. Carapace: generally reddish brown with a short, moderately broad supramarginal white stripe; a patch of white hairs between and below PME and PLE; a broken white stripe from thoracic groove toward posterior border; clypeus with a brush of white hairs, but very few of these on base of chelicerae. Abdomen: with a white basal band, a wider reddish band followed by another narrow whitish band; posterior half of dorsum includes a central series of small light spots and two pairs of white dots. Palp: femur not notably modified, with poorly developed dorsal white crest; tibial apophysis a robust beaklike process; bulb with a single basal lobule; embolus a long slender prolateral distal filament ..... *P. delecta*, (p. 212)
4. Not with combination of characters given above 5
5. Carapace: almost black with small white patches just dorsal to AME, between PME and PLE, between PLE, and extending back to posterior declivity; clypeus and base of chelicerae with long white simple hair. Abdomen: with a median dorsal yellowish stripe, very broad at base, much indented and tapered to a point near anal tubercle. Palp: femur not notably modified, without dorsal crest; bulb with a simple basal lobule; embolus a very short, sharply pointed spine; tibial apophysis a short robust spur with distal half turned sharply toward excavation at base of cymbium *P. donaldi*, (p. 212)
5. Not with combination of characters given above 6
6. Carapace: generally dark reddish brown with a moderately broad complete marginal white stripe; a patch of white hairs between PME and PLE; a short median white stripe from thoracic groove to near middle of posterior declivity; clypeus with a brush of white hairs, but only a few white hairs on base of chelicerae. Abdomen: with a narrow basal band extending dorso-

laterally to middle where it turns dorsally; nearly whole dorsum bright red; posterior half of dorsum with two small central white spots and a pair of dorsolateral white spots. Palp: femur not notably modified, with dorsal white crest which extends over patella; tibial apophysis a short blunt spur; bulb with a simple basal lobule; embolus a short robust pointed spine.... *P. dybowskii*, (p. 215)

6. Not with combination of characters given above.....7
7. Carapace: generally dark brown with small white patches between PME and PLE, over thoracic groove, and three on posterior declivity; clypeus and base of chelicerae with many white hairs. Abdomen: with three small white spots at base; anterior two fifths of dorsum bright orange red; posterior three fifths of dorsum with a black central spot containing a central series of light spots and two small white lateral dots; dorsolaterally orange red. Palp: femur not notably modified, with a moderately developed white dorsal crest which extends over patella; bulb with a distinct single basal lobule; embolus a long slender distal spine; tibial apophysis a stout distally hooked spur..... *P. interrupta*, (p. 219)
7. Not with combination of characters given above.....8
8. Carapace: generally rich dark reddish brown with a broad white marginal stripe to opposite PLE, a white spot between PLE; clypeus with very few whitish hairs and none on base of chelicerae. Abdomen: generally almost black dorsally; with a series of four central white spots and a series of three dorsolateral white spots on each side. Palp: femur somewhat enlarged in distal half, with a moderately developed dorsal white crest; bulb distinctly bilobate at base, lobules well separated; embolus a long distal sinuous filament, stout at base; tibial apophysis a moderately long slender spur, stout at base..... *P. magnifica*, (p. 226)
8. Not with combination of characters given above.....9
9. (Taken from F. Cambridge's work) Carapace: dark mahogany with a moderately broad white marginal stripe, a central white stripe from thoracic groove to posterior declivity, and a pair of white spots between ALE. Abdomen: with a narrow basal white band extending dorsolaterally to communicate with a white band across the middle; across posterior fourth of dorsum occurs a row of three white spots in front of which are two very narrow white cross bands diverging in middle; anterior half of dorsum golden yellow except as noted. Palp: bulb mildly bilobate at base; embolus a straight robust spine, stout at base, pointed distally; tibial apophysis a short stout curved spur..... *P. niveo-guttata*, (p. 233)
9. Not with combination of characters given above.....10
10. Carapace: generally dark brown with a broad dorsolateral stripe of loose white hairs, a light stripe from between PLE to near posterior border, a patch of loose white hairs between ALE; clypeus with only a few whitish hairs and none on base of chelicerae. Abdomen: with a patch of light colored hair at base; three light colored spots near middle of dorsum; in posterior fourth of dorsum are four small snow white dots; with more or

less orange red hair all over dorsum. Palp: femur unmodified, without dorsal white crest; bulb with a simple single basal lobule; tibial apophysis a robust spur excavated medially and strongly curved toward excavated base of cymbium; embolus a short pointed spine, stout at base.....
P. panamae, (p. 239)

10. Carapace: generally very dark brown with a moderately broad short white marginal stripe to opposite PLE, a narrow central white stripe from between PLE to middle of posterior declivity; clypeus with very few whitish hairs and base of chelicerae devoid of them. Abdomen: black at base; often with a short narrow central dorsal light stripe; nearly whole dorsum a bright red bordered dorsolaterally with black. Palp: femur not notably modified, with a poorly developed white dorsal crest; bulb bilobate at base with retrolateral lobule elongated; tibial apophysis very slender and deeply bifid distally; embolus long, slender, distally curved..*P. pratensis*, (p. 239)

Females

1. Carapace: interocular area reddish brown, overlaid with loose white hairs; lateral sides yellowish, streaked with brown; a broad irregular central stripe from thoracic groove to posterior border. Abdomen without definite red stripes or bars. Epigynum: with a slight posterior marginal notch; anterior half of plate with a pair of deep depressions convergent in front
P. bicuspidata, (p. 207)

1. Not with combination of characters given above.....2

2. Carapace: generally dark brown; with a complete white lateral stripe including clypeus; a narrow white band between ALE; a central white stripe from between PLE nearly to posterior border. Abdomen: with an orange red dorsal bar in anterior third in front of which is a white bar and behind which another white bar more or less broken into spots. Epigynum: with posterior margin scalloped; in anterior half of plate are two minute black spots, four or five diameters of one of them apart....*P. delecta*, (p. 212)

2. Not with combination of characters given above.....3

3. Carapace: generally dark brown; with a narrow white marginal stripe connecting with white fringe on clypeus; a narrow central white stripe from between PLE to middle of posterior declivity. Abdomen: with two dorsal bright red stripes incompletely separated by a central white stripe. Epigynum: with a shallow posterior marginal notch and a moderately deep, slender recess; central part of plate includes a pair of somewhat slit-like transverse openings about the length of one of them apart.....
P. dybowskii, (p. 215)

3. Not with combination of characters given above.....4

4. (Taken from F. Cambridge's work) Carapace: generally light brownish; with a white marginal stripe and a white central stripe from thoracic groove to posterior border. Abdomen: without any red on dorsum.

Epigynum: with posterior margin scalloped; anterior half of plate with a single, large nearly circular cavity..... *P. elegans*, (p. 218)

4. Not with combination of characters given above.....5
5. (Taken from study of type) Carapace: generally light brown, perhaps yellow in life; with a very narrow white marginal stripe not including clypeus; with white hairs over much of interocular area. Abdomen: without red stripes or red bars. Epigynum: without a posterior marginal notch, but with a distinct lip and a deep recess; anterior half of plate with a pair of small depressions about a diameter of one of them apart..... *P. flavescens*, (p. 219)
5. Not with combination of characters given above.....6
6. (Taken from F. Cambridge's work; data very meagre) Epigynum: without posterior marginal notch; just in front of posterior margin is a pair of fairly large circular bodies, contiguous medially; anterior half of plate with a pair of nearly transverse depressions, confluent medially..... *P. geminata*, (p. 219)
6. Not with combination of characters given above.....7
7. Carapace: with seven quite conspicuous stripes; a broad white lateral stripe on each side including clypeus; a central white stripe from AME to middle of posterior declivity; two dorsolateral brown stripes; a narrow irregular brown marginal stripe. Abdomen: with a pair of broad, oblique, bright red bars near base in addition to several white bars and spots. Epigynum: without posterior marginal notch; with a nearly straight marginal lip; two small openings near middle of plate little more than a diameter of one of them apart..... *P. interrupta*, (p. 219)
7. Not with combination of characters given above.....8
8. Carapace: generally brownish; nearly black quadrilateral spot covering ocular area; without definite stripes. Abdomen: with five definite stripes, dorsal and dorsolateral, but much variation noted; a central white stripe separating a pair of brownish stripes overlaid with bright red hair; a pair of dorsolateral white stripes. Epigynum: with a moderately well defined posterior marginal notch and a fairly deep recess; anterior half of plate with a pair of small reniform bodies medial to a pair of small similar depressions *P. maculosa*, (p. 223)
8. Not with combination of characters given above.....9
9. Carapace: generally almost black; with a broad yellowish marginal stripe including clypeus; a broad central yellowish stripe from AME to middle of posterior declivity. Abdomen: without red bars or red stripes, but with a striking pattern of yellow spots and black ground. Epigynum: often obscure because of presence of gummy secretion; posterior margin without a definite notch; in front of posterior margin lies a definite lip and a slender recess; central part of plate occupied by two large lateral curved depressions with strongly chitinized curved boundaries.... *P. magnifica*, (p. 226)
9. Not with combination of characters given above.....10

10. Carapace: generally almost black; with a narrow yellowish marginal stripe and a broad yellowish recurved bar behind PLE; clypeus and base of chelicerae devoid of light hairs. Abdomen: with a striking pattern of yellow and black. Caution: color pattern exceedingly variable; yellow may be red; see description. Epigynum: with distinct posterior marginal notch and a moderately deep recess; nearly whole plate occupied by two large deep depressions confluent anteriorly ..... *P. mimica*, (p. 229)
10. Not with combination of characters given above 11
11. (Taken from F. Cambridge's work) Carapace: dark mahogany; with a moderately wide white marginal stripe; with a central broad white stripe from thoracic groove to middle of posterior declivity, and a pair of white spots more or less united between ALE. Abdomen: without red stripes or red bars, but with a series of white dorsal bars and golden yellow spots. Epigynum: with a shallow posterior marginal notch and a short lip; central part of plate occupied by a pair of large, somewhat reniform depressions, convergent in front ..... *P. niveo-guttata*, (p. 233)
11. Not with combination of characters given above 12
12. Carapace: lateral sides whitish with brown dots; a narrow brown marginal stripe; a central white stripe from AME to posterior border; clypeus with many white hairs. Abdomen: with a pair of broad, bright, orange-red dorsal stripes with intermixed black hairs, separated by a yellowish central stripe. Epigynum: with a distinct posterior marginal notch and a deep recess; anterior half of plate with a pair of depressions of moderate size, somewhat more than a diameter of one of them apart . . *P. orvillei*, (p. 234)
12. Not with combination of characters given above 13
13. Carapace: generally reddish brown; with broad whitish marginal stripe; with a central whitish stripe from between PLE to posterior border, and also many whitish hairs in ocular area; clypeus with a white fringe. Abdomen: without definite red stripes or red bars. Epigynum: posterior margin scalloped and with a broad but shallow recess; anterior half of plate with a pair of small depressions, with heavy lateral boundaries, confluent medially ..... *P. pallida*, (p. 236)
13. Not with combination of characters given above 14
14. Carapace: generally dark brown to black through middle region; with a narrow central white stripe from opposite PME to middle of posterior declivity; a short broad lateral whitish stripe; a very narrow brownish marginal stripe; several light and dark narrow oblique stripes in ocular region. Abdomen: dorsum with intricate pattern of bright red and black stripes and dots. Epigynum: with a broad shallow posterior marginal notch; a slender medial septum in posterior half of plate; anterior half of plate with a single recurved central depression ..... *P. pratensis*, (p. 239)
14. Carapace: ocular area dark brown; elsewhere with seven stripes; a central white stripe from thoracic groove to posterior border, a lateral whitish stripe, a marginal brownish stripe, and dorsolateral brownish stripe on each side. Abdomen: with no red stripes or red bars; with three irregular dorsal

and dorsolateral light stripes, and two dorsal brownish stripes. Epigynum: with a shallow posterior marginal notch; just in front of posterior margin, occupying central part of plate, is a large, somewhat oval depression.....
P. simplicicava, (p. 240)

PHIALE ALICEAE spec. nov.

Figures 172–173

Male holotype. Total length 4.48 mm. Carapace 2.32 mm. long, 1.60 mm. wide a short distance behind PLE which occupy forty forty-sevenths of the width of the carapace at their level, 1.02 mm. tall and, therefore, .64 as tall as wide; gently arched from AME to steep posterior declivity which begins about three fifths of the distance from PLE to posterior border; with a plentiful supply of black and white hair distributed as given later; with a short median longitudinal thoracic groove a short distance behind PLE.

Eyes. Anterior row recurved so that dorsal borders of AME are level with those of ALE. Anterior row wider than posterior row in ratio of 63 : 60, wider than middle row in ratio of 63 : 56. Quadrangle of laterals wider than long in ratio of 63 : 46. Total eye space occupies about twenty-seven fifty-firsts of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 21 : 11.5 : 3.5 : 10. AME slightly separated from one another, and from ALE. Middle eyes equidistant from ALE and PLE. Height of clypeus equal to one fourth of the diameter of AME. Clypeus decorated only with a fringe of yellowish bristles along ventral margin, three long bristles beneath outer border of AME, and three long brown upturned bristles in lower angle between AME.

Chelicerae. Parallel, vertical; only gently rounded in front; with a well developed basal boss; basal segment .85 mm. long. Fang fairly robust, evenly curved. Fang groove distinct; with two promarginal teeth as usual; with a single rather robust retromarginal tooth.

Maxillae. Essentially parallel; very weakly concave along outer border; longer than wide in middle in ratio of about 27 : 16; outer distal angle continued far to outer side where a distinct hook appears in an unusual position.

Lip. Wider than long in ratio of about 5 : 4; well rounded distally; basal excavations reach about one third the length of the organ; reaches just short of the middle of the maxillae; sternal suture straight.

Sternum. Scutiform; longer than wide in ratio of 21 : 16, widest between second coxae; anterior border wider than base of lip; moder-

ately convex, especially in posterior half; posterior end bluntly rounded and not extended between fourth coxae which are barely separated.

Legs. 1432. Tibial index of first leg 14, of fourth leg 15.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.47	.83	1.26	.96	.64	5.16
2.	1.15	.64	.73	.64	.45	3.61
3.	1.34	.70	.90	.96	.51	4.41
4.	1.47	.64	1.02	1.08	.58	4.79
Palp	.83	.28	.26	—	.83	2.20

All legs with a moderate supply of long and short simple hair. First pair with more ventral hair on patellae and tibiae and metatarsi than others and this might be regarded as the vestiges of a ventral fringe.

Spines. First leg: femur dorsal 0–1–1–1, prolateral only distal 2; patella only prolateral 0–1–0; tibia prolateral 1–0–1, ventral 2(promarginal small)–2–2(terminal); metatarsus only ventral 0–2–2. Second leg: femur and patella as in first; tibia only prolateral 1–1–1, ventral 1r–2–2 on right side, 1r–1r–1p–0 on left side; metatarsus as in first except prolateral 0–1. Third leg: femur dorsal 0–1–1–1, prolateral 0–0–1–2, retrolateral only distal 2; patella prolateral and retrolateral 0–1–0; tibia dorsal 1–0–0, prolateral and retrolateral 1–1–1, ventral 1p–0–2; metatarsus prolateral 1–2, retrolateral 1–1–2, ventral 0–2–2. Fourth leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 2; patella as in third; tibia as in third except ventral 0–1p–0–2 on right, 1p–1p–0–2 on left; metatarsus prolateral and retrolateral 1–1–2, ventral 0–2–2. Palpal spines: only femur dorsal 0–1–1–1–0.

Palp. Femur only slightly bent prolaterally, principally in the basal half, considerably widened dorsoventrally so that it is longer than wide in ratio of about 2 : 1; with a dorsal distal cap of long white lanceolate hairs; patella and tibia both short and of about equal length; tibial retrolateral apophysis a broad, deeply excavated, dorsally curved hook; bulb considerably swollen, distinctly bilobed at base; embolus with a broad base and a slender distal spine nearly as long as basal part, accompanied by a lateral process about as long as the whole embolus including the base and hooked distally (Figs. 172–173).

Abdomen. Ovoid, almost a perfect oval in outline; longer than wide in ratio of 7 : 4; widest about three sevenths of length from base; anal tubercle a short flattened black cone; spinnerets as usual in the genus;

position of colulus not specially indicated; tracheal spiracle near base of spinnerets and with a thin lip but no tubercle.

Color in alcohol. Carapace: generally dark brown, almost black because of presence of simple black hair; a central yellowish white stripe from just behind AME to a point about the middle of steep posterior declivity; widest just behind PLE; a fairly broad yellowish white marginal stripe on each side from opposite PME to posterolateral corner. Palps yellowish brown except the darker proximal half of femur. Chelicerae dark brown in front, elsewhere light brown. Sternum almost black. Maxillae and lip dark brown with whitish tips. Legs: first coxae dark brown, second coxae whitish except a retrolateral rounded dark brown spot, third and fourth coxae entirely whitish; first leg beyond coxa brown with femur darkest and tarsi light brown; second leg with dark femur, yellowish with brown spots elsewhere; third leg much like second except the spots are lacking on tarsi and metatarsi, and scarce on tibiae and patellae; fourth pair much like second. Abdomen: black at base and along lateral sides; dorsally a narrow whitish basal band continues dorsolaterally as a narrow stripe beyond middle, with a small white dorsolateral spot still farther posteriorly; nearly whole dorsal area bright rust-red with a narrow light colored central bar, a small white spot on anterior border of the black posterior tip end including anal tubercle; venter with a short, median, nearly black stripe, on each side of which is a short yellowish stripe; elsewhere nearly black.

Type locality. Male holotype from Porto Bello, R. P., Aug., 1936. No paratypes.

Phiale bicuspidata (F. Cambridge), 1901

Cyrene bicuspidata F. Cambridge, 1901
P. bicuspidata Simon, 1903
Cyrene bicuspidata Banks, 1909
P. bicuspidata Petrunkevitch, 1911
P. bicuspidata Petrunkevitch, 1925

Formerly known from three localities in Panama and Costa Rica. I have found it common in several places where I have collected and I have it from the following localities: Canal Zone Biological Area, June–July, 1934; June–Aug., 1936; June–Aug., 1939; El Valle, R. P., July, 1936; Porto Bello, R. P., Aug., 1936; Ft. Davis, C. Z., Aug., 1936; France Field and Ft. Sherman, C. Z., Aug., 1939; Chilibre and Madden Dam region, C. Z., Aug., 1939; C. Z. Forest Reserve, C. Z., July–Aug., 1939; Boquete, R. P., July, 1939.

Phiale bilobata (F. Cambridge), 1901

Figures 174–177

Cyrene bilobata F. Cambridge, 1901
Freya bilobata Petrunkevitch, 1911
F. bilobata Petrunkevitch, 1925
F. bilobata Banks, 1929

Male hypotype. Total length 5.76 mm. Carapace 2.82 mm. long, 1.86 mm. wide a short distance behind PLE which occupy six sevenths of the full width of carapace at their level, 1.15 mm. tall and, therefore, considerably less than two thirds as tall as wide. Ascent very gentle from AME to just medial to PLE, then almost flat to beginning of steep posterior declivity, about four sevenths of distance from PLE to posterior border; a short median longitudinal thoracic groove beginning between posterior borders of PLE. Numerous long black bristles in ocular area.

Eyes. Viewed from above, anterior row recurved so that dorsal borders of ALE lie slightly ventral to dorsal borders of AME. Anterior row and posterior row equally wide. Anterior row and posterior row wider than middle row in ratio of 33 : 29. Quadrangle of laterals wider than long in ratio of 33 : 25. Total eye space occupies eight seventeenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 23 : 10.5 : 3 : 10. AME barely separated and only slightly farther from ALE. Middle eyes about equidistant from ALE and PLE. Height of clypeus equal to one fifth the diameter of AME. Clypeus decorated with a moderate amount of long white hair which converges toward middle line, two long stiff bristles beneath each AME and three forming a triangle in lower angle between AME.

Chelicerae. Fairly robust, somewhat swollen in front in a low ridge which extends from basal medial corner toward outer distal corner but disappears before reaching it; parallel; with a few long whitish hairs in front; basal segment 1.00 mm. long. Fang moderately robust, evenly curved. Fang groove with a fairly stout bicuspid tooth on promargin (only a single cusp on right side, but paratypes seem to show it as a regular feature); a single simple stout retromarginal tooth (Fig. 174).

Maxillae. Parallel, longer than wide in middle in ratio of 7 : 3; anterior border of outer corner with a small hook a short distance from margin; with well developed scopula along truncature and a part of medial edge (Fig. 175). Some features only observable by dissection of paratypes.

Lip. Longer than wide in ratio of 11 : 9; inserted somewhat dorsal to level of anterior border of sternum; basal excavations reach a little beyond basal third; reaches well beyond middle of maxillae. Sternal suture straight.

Sternum. Generally scutiform; longer than wide in ratio of about 5 : 3; almost equally wide between second and third coxae; posterior end blunt and not extended between fourth coxae which are separated by one fourth of their width.

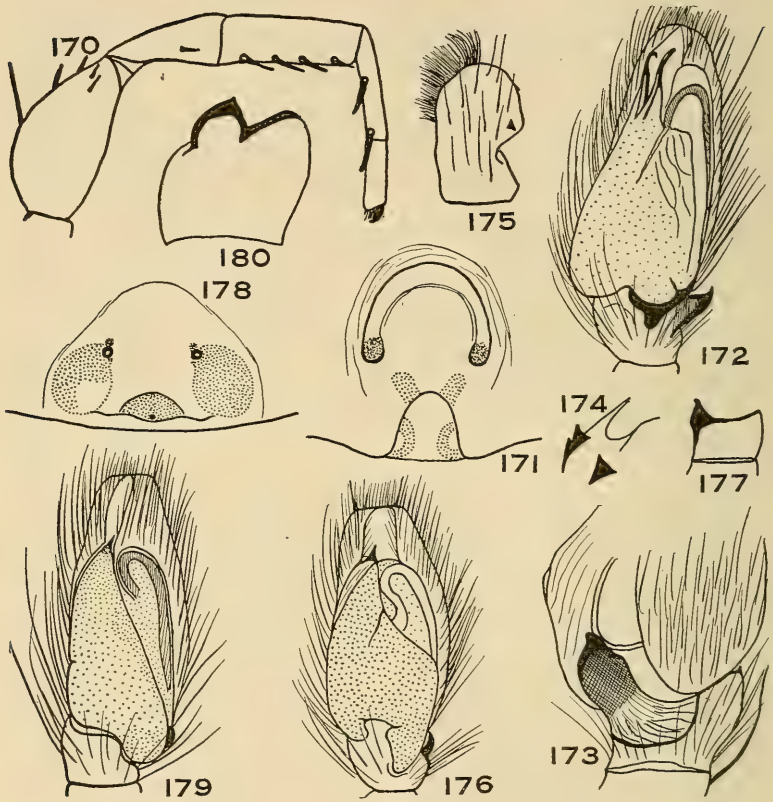
Legs. 1432. Tibial index of first leg 13, of fourth leg 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.73	1.15	1.60	1.21	.77	6.46
2.	1.35	.77	.90	.90	.58	4.50
3.	1.54	.82	1.02	1.26	.58	5.22
4.	1.54	.76	1.15	1.35	.64	5.44
Palp	.66	.24	.24	—	.75	1.89

A poorly developed ventral fringe on anterior femora and patellae.

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral and retrolateral distal 2; patella only prolateral and retrolateral 0–1–0; tibia only prolateral 1–0–1, retrolateral 0–1, ventral 2–2–2; metatarsus prolateral and retrolateral 0–0–1, ventral 2–2 (some irregularities in spination have been noted between right and left sides as well as among different individuals; where a spine occurs on one side and not on the other I have recorded it as present). Second leg: femur and patella as in first except patella retrolateral 0; tibia only prolateral 1–1, ventral 1r–2–2; metatarsus as in first. Third leg: femur dorsal 0–0–1–1–1, prolateral and retrolateral 0–0–0–1–2; patella as in first; tibia dorsal 1–0–0, prolateral and retrolateral 1–1–1 (middle one out of line dorsally), ventral 0–1p–2; metatarsus prolateral 1–2, retrolateral 1–1–2, ventral 2–1p. Fourth leg: femur and patella as in first; tibia as in third except ventral 2–2; metatarsus prolateral and retrolateral 1–1–2, ventral 0–2–2. Palpal spines: femur dorsal 0–1–1–0.

Palp. Femur curved prolaterally; a snow white dorsal crest on distal half is continued onto proximal half of patella; patella and tibia equal in length and both short; tibia with a small, retrolateral, distal, strongly chitinized lobe and a short, somewhat beak-like and somewhat flattened, retrolateral apophysis; bulb bilobed at base; contiguous to retrolateral tibial apophysis basal lobe is more than twice as long as other lobe; embolus a very short spine at tip of bulb (Figs. 176-177).



External Anatomy of Spiders

Fig. 170. *Monaga benigna* Chickering; first leg, prolateral view.
Fig. 171. *M. benigna* Chickering; epigynum, ventral view.
Figs. 172–173. *Phiale aliceae* Chickering; male palp, ventral view; and palpal tibia, retrolateral view.
Fig. 174. *P. bilobata*, male cheliceral teeth.
Fig. 175. *P. bilobata*, male maxilla.
Figs. 176–177. *P. bilobata*, male palp, ventral view; and palpal tibia, retrolateral view.
Fig. 178. *Phiale delecta*, epigynum, ventral view.
Figs. 179–180. *P. donaldi* Chickering; male palp, ventral view; and palpal tibia, retrolateral view, larger scale.

Abdomen. Ovoid; longer than wide in ratio of 2 : 1; widest about two fifths from base; anal tubercle a somewhat flattened yellowish white cone; spinnerets of moderate length and with relative proportions as usual in this group, posterior pair spread apart so as to expose to view the middle pair; position of colulus uncertain; tracheal spiracle near base of spinnerets and not guarded by a tubercle.

Color in alcohol. Palp: femur brownish, much streaked with black; the more distal segments amber color; femur and patella with white hair as already noted. Chelicerae very dark brown in front, amber behind and around fang and fang groove. Maxillae and lip dark brown, more or less streaked, yellowish white at tips. All legs dark brown with much black hair and spots of white hair which is very easily removed by rubbing; first and second coxae dark brown, third coxae much lighter, fourth coxae yellowish white. Sternum dark brown. Carapace: a white spot behind AME; a white stripe on each side beginning at ALE and passing backward below PME and PLE, curves dorsally to connect with a large white spot which in life may cover most of thoracic region from PLE to beginning of steep posterior declivity; another white spot on each side just dorsal to and behind PME; background color is dark brown to light brown beneath white hair on dorsal part of thoracic region; much black hair especially on lateral sides and posterior declivity; a white stripe of moderate width on each side from posterolateral corner to opposite PLE. Abdomen: nearly black at base; this continues laterally to spinnerets which are black except at their bases where they are yellowish white; dorsal to black base is a narrow white band which also continues laterally nearly to base of spinnerets; there are two bright rust-red stripes joined anteriorly but separated centrally by a narrow whitish stripe; beneath the red stripes the ground color is dark brown and, since hairs which give the red color are easily rubbed off, the color may be almost anything between brown and red (Cambridge described it as "brown-yellow, with a complete marginal white band and a broken central dorsal pale band"); venter nearly black with four rows of yellowish dots and a triangular yellowish white spot just behind genital groove (this spot is sometimes reduced to disappearance in certain specimens).

Type locality. Male hypotype from Canal Zone Biological Area, June, 1936; numerous males from the same locality, June–July, 1934, 1936; July, 1939; Frijoles and C. Z. Forest Reserve, C. Z., Aug., 1939.

Phiale delecta (Peckham), 1896

Figure 178

Cyrene delecta Peckham, 1896
C. delecta F. Cambridge, 1901
P. delecta Simon, 1903
C. delecta Banks, 1909
P. delecta Petrunkevitch, 1911
P. delecta Petrunkevitch, 1925

I have one female from Porto Bello, R. P., and another from Arraijan, R. P., both taken in Aug., 1936. Both are well marked and not badly rubbed as they are so likely to be after so much transportation and handling. They are identical in their markings and general appearance. There is a white band just behind AME; the central stripe is broad between PLE, narrows gradually and extends nearly to posterior margin, but does not extend forward to meet the white band; the lateral stripes are rather narrow, leaving the ventral border almost black; thus in the thoracic area there are four black and three white stripes; the clypeus has a coat of white hairs continuous with the lateral white stripes. The Peckhams' specimens from Mexico (others are not available now) usually have no broad marginal dark stripes, at most a very narrow marginal stripe and this leads me to suspect more or less well marked color varieties of this species in Central and South America throughout its range. The epigynum (Fig. 178) is scalloped along its posterior margin; two small black spots occur in the middle of the plate; two large oval spermathecae lie somewhat more than the length of one of them apart near the lateral ends of the posterior margin of plate. The epigynum appears somewhat different to me than it apparently did to Professor Petrunkevitch ('25) whose figure may be compared with mine.

Phiale donaldi spec. nov.

Figures 179–180

Male holotype. Total length 6.02 mm. Carapace 2.88 mm. long, 2.05 mm. wide a short distance behind PLE which occupy about twenty-five twenty-ninths of the whole width of carapace at their level, 1.28 mm. tall and, therefore, .62 as tall as wide; descent from PLE at first somewhat abrupt, then very gradual to steep posterior declivity which begins at five sevenths of the distance from PLE to posterior border; with a short medial longitudinal thoracic groove beginning just behind PLE.

Eyes. Anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one tenth of the diameter of AME. Anterior row and posterior row equally wide, both wider than middle row in ratio of 26 : 23. Quadrangle of laterals wider than long in ratio of 26 : 17. Total eye space occupies twenty-one forty-sixths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 26 : 12 : 3 : 11. AME slightly separated from one another and from ALE. Middle eyes equidistant from ALE and PLE. Height of clypeus equal to one fourth of the diameter of AME. Clypeus decorated only with a ventral irregular row of long white hairs convergent toward the middle line, three long brown bristles beneath outer boundary of AME, three long upturned brown bristles in lower angle between AME, and a small amount of simple black hair.

Chelicerae. Parallel, vertical; moderately produced; basal segment 1.10 mm. long; moderately swollen in front near base; covered over basal three fourths and along outer border with long white hair. Fang moderately robust, evenly curved except in basal third where there are irregularities on outer surface. Fang groove distinct; with two black promarginal teeth as usual, and a single fairly robust black retromarginal tooth.

Maxillae. Parallel; longer than wide in ratio of 7 : 3; quite deeply notched in middle of outer border; outer distal angle drawn out into a broad tubercle which adds considerably to the width of distal end; palp inserted into basal two fifths.

Lip. As wide as long; basal excavations reach about one third of length of organ; reaches a little beyond middle of maxillae. Sternal suture gently procurved.

Sternum. Scutiform; longer than wide in middle in ratio of 10 : 7; widest between second coxae; moderately convex especially in posterior half; anterior border slightly narrower than base of lip; posterior end bluntly rounded and not extended between fourth coxae which are separated by nearly one third of their width. Anterior coxae considerably the stoutest.

Legs. 1432. Tibial index of first leg 11, of fourth leg 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.24	1.21	2.18	1.73	.98	8.34
2.	1.60	.96	1.10	.96	.61	5.23
3.	1.79	.90	1.20	1.41	.70	6.00
4.	2.03	.90	1.26	1.53	.69	6.41
Palp	.82	.32	.30	—	.83	2.27

All legs with a moderate amount of long and short simple hair. First and second femora have an unusual amount of erect white simple hair on prolateral and ventral surfaces.

Spines. First leg: femur dorsal 0–1–1–1, prolateral only distal 2; patella only prolateral 0–1–0; tibia only prolateral 1–0–1, ventral 2–2–2 (terminal); metatarsus only ventral 0–2–2. Second leg: femur and patella as in first except femur retrolateral 0–0–1–2; tibia prolateral 1–0–1, retrolateral 1–0–0, ventral 2–2–2; metatarsus prolateral 1–1, retrolateral 0–1, ventral 2–2. Third leg: femur dorsal 0–1–1–1, prolateral 0–1–2, retrolateral only distal 2; patella prolateral and retrolateral 0–1–0; tibia dorsal 1–0–0, prolateral and retrolateral 1–1–1, ventral 1p–0–2; metatarsus prolateral 1–2, retrolateral 1–1–2, ventral 0–2–2. Fourth leg: femur and patella as in third except femur retrolateral distal 1; tibia as in third; metatarsus prolateral and retrolateral 1–1–2, ventral 0–2–2. Palpal spines: only femur dorsal 0–1–1–1.

Palp. Femur only slightly bent prolaterally; patella and tibia both short and about equally long; tibial retrolateral apophysis a short robust spur which is turned in distal half at a right angle toward base of cymbium where it appears to fit into an excavation [somewhat as in *Freya grisea* (F. Cambridge)]; bulb considerably swollen basally where a retrolateral lobule overlaps the tibia; embolus arises from beneath anterior end of larger subdivision as a very short, sharply pointed spine (Figs. 179–180).

Abdomen. Ovoid; longer than wide in ratio of 12 : 7, widest about one third from base from which region it tapers nearly to a posterior point; short flattened conical anal tubercle with a tuft of snow white hairs; spinnerets as usual in the group; position of colulus indicated by a tuft of stiff bairs; tracheal spiracle near base of spinnerets, with a thin lip but with no tubercle.

Color in alcohol. Carapace: ground color light brownish, much spotted and streaked with black, but the black hair makes a generally somber appearance; a central white spot just behind AME; a small white spot just ventral to and behind PME; between PLE is a large light spot narrowed at thoracic groove and overlaid with white hairs extending to middle of steep posterior declivity. Sternum yellowish brown with many small, dark brown dots and covered with stiff white bristles. Chelicerae reddish brown with white hairs as already noted. Maxillae and lip brown with yellowish white tips. Legs: first and second pairs brown, much streaked with lighter and darker shades; third and fourth pairs with much the same markings as first and second, but each femur has a large elongated patch of white lanceolate hairs in

middle of dorsal surface. Abdomen: nearly black at base and dorsolaterally; centrally at base is a large yellowish spot, the first of a series of six diminishing in size and extending nearly to anal tubercle; on each side of the fourth central yellowish spot is a small light colored spot; black and yellow color due to hair, when rubbed the color pattern may be very different; two pairs of obscure dorsal sigilla in second fourth from base; lateral sides nearly black, with an oblique whitish mark near middle and a similar short stripe in posterior third; venter whitish with a short, black, medially constricted central stripe in front of genital groove and a short black stripe on each side in posterior third with a black bar just in front of tracheal spiracle.

Type locality. Male holotype from the Canal Zone Biological Area, June, 1939. Six male paratypes from: Canal Zone Biological Area, June–July, 1934; June, August, 1936; Madden Dam region, C. Z., Aug., 1936; Canal Zone Forest Reserve, C. Z., July–August, 1939.

Phiale dybowskii (Taczanowski), 1871

Figures 181–183

Attus dybowskii Taczanowski, 1871
Pachomius dybowskii Peckham, 1896
Cyrene dybowskii F. Cambridge, 1901
Phiale dybowskii Simon, 1903
P. dybowskii Petrunkevitch, 1911
Pachomius dybowskii Banks, 1929
Phiale lineola Chamberlin and Ivie, 1936
Freya nannispina Chamberlin and Ivie, 1936

The Peckhams regarded this species as a close relative of Balmaceda, Pseudicius, and Menemerus. F. Cambridge did not have the male in his collection and did not include it in his keys because he thought the available descriptions were not sufficiently revealing for the purpose. This is a common species on the Atlantic side of Panama and also occurs on the Pacific side. Since no detailed description has ever been published, I consider it worth while to do so at this time.

Male hypotype. Total length 5.25 mm. Carapace 2.88 mm. long, 1.90 mm. wide a short distance behind PLE which occupy nearly fifteen sixteenths of the total width of the carapace at their level, 1.22 mm. tall and, therefore, .66 as tall as wide; well supplied with white and black hair; descent very gradual from PLE to steep posterior

declivity which begins about half way from PLE to posterior border; a short median longitudinal thoracic groove beginning just opposite the posterior borders of PLE.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of AME are just slightly dorsal to those of ALE. Anterior row equal in width to posterior row, both wider than middle row in ratio of 50 : 43. Quadrangle of laterals wider than long in ratio of 25 : 19. Total eye space occupies forty-six eighty-fifths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 25 : 12.5 : 3 : 11.5. AME separated from one another by one twentieth of their diameter, from ALE by one twelfth of their diameter. Middle eyes closer to ALE than to PLE in ratio of about 7 : 9. Height of clypeus equal to one third the diameter of AME. Clypeus decorated with long white lanceolate hair which thickly covers the ventral two thirds of clypeal space beneath AME but swings upward laterally to unite with lateral white stripes, a single long brownish bristle beneath outer margin of each AME, and three long upturned bristles in lower angle between AME.

Chelicerae. Vertical, parallel, moderately produced; with basal segment 1.02 mm. long; with well developed boss; considerably swollen in front about two fifths from base, with a group of white hairs covering the gibbosity. Fang moderately robust, especially at base, evenly curved. Fang groove distinct; as usual in the genus, with the smaller medial and the larger outer promarginal teeth at inner end of groove; retromargin with a single, fairly robust tooth near medial end of groove.

Maxillae. Parallel, longer than wide in middle in ratio of about 7 : 3; moderately notched in middle of outer border; outer distal corner smoothly rounded and continuous with distal border, with no tubercle or hook.

Lip. Longer than wide in ratio of 12 : 11; moderately convex along posterior surface; basal excavations reach nearly five twelfths the length of the organ; reaches a little beyond middle of maxillae. Sternal suture gently procurved.

Sternum. Elongate scutiform; longer than wide in ratio of about 5 : 3, widest between second coxae; moderately convex; anterior border slightly narrower than base of lip; posterior end squarely truncate and not extended between fourth coxae which are separated by two fifths of their width.

Legs. 1432. Tibial index of first and fourth legs 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.66	1.03	1.54	1.08	.77	6.08
2.	1.29	.77	.90	.77	.58	4.31
3.	1.54	.71	.96	1.15	.58	4.94
4.	1.60	.82	1.23	1.34	.65	5.64
Palp	.77	.28	.22	—	.77	2.04

All legs with a moderate supply of long and short simple hair and white lanceolate hair in spots as noted later. No fringes on any legs.

Spines. First leg: femur dorsal 0–1–1–1, prolateral distal 2; patella only prolateral 0–1–0; tibia only prolateral 1–0–1, ventral 2–2–2 (terminal); metatarsus only ventral 0–2–2. Second leg: femur and patella as in first; tibia only prolateral 1–1(offset dorsally)–1, ventral 1r–2–2; metatarsus only prolateral 0–1, ventral 0–2–2. Third leg: femur dorsal 0–1–1–1, prolateral 0–0–1–2, retrolateral 0–0–1–1; patella prolateral and retrolateral 0–1–1; tibia dorsal 1–0–0, prolateral and retrolateral 1–1–1, ventral 0–1p–0–2; metatarsus dorsal 0–1–0, prolateral 1–2, retrolateral 1–1–2, ventral 0–2–2. Fourth leg: femur dorsal 0–1–1–1, prolateral 0–0–1–2, retrolateral only distal 1 on left and distal 2 on right; patella and tibia as in third; metatarsus prolateral and retrolateral 1–1–2, ventral 0–1r–2. Palpal spines: femur dorsal 1–1–1, and two short straight spines at distal end of cymbium.

Palp. Femur moderately bent prolaterally; both patella and tibia short, with latter about three fourths as long as former; retrolateral tibial apophysis a very short slender spur bent ventrally at a forty-five degree angle; distal two thirds of femur and whole of patella covered dorsally with white lanceolate hairs; bulb moderately swollen, with a retrolateral basal lobule which overlaps the tibia; embolus a very short spine arising near distal end of bulb on prolateral side (Figs. 181–182).

Abdomen. Ovoid, almost a complete oval in outline from base to anal tubercle; longer than wide in ratio of 3 : 2, widest in middle; spinnerets slender, with posterior pair spread apart so that slender middle pair is exposed; position of colulus indicated by a small tuft of black hairs; tracheal spiracle near base of spinnerets, with indistinct lip but no tubercle.

Color in alcohol. Carapace; generally a rich mahogany brown, with eyes on black spots, and with black hair increasing depth of color: white lanceolate hair distributed in a series of spots; a small white spot between PME and PLE, a median narrow white stripe from thoracic groove about half way to posterior border, and a marginal white stripe from clypeus to posterolateral corner on each side. Chelicerae brown with white hair in front. Maxillae and lip lighter brown with yellow-

ish white tips. Sternum with an irregular light yellowish margin, elsewhere dark brown. Legs: first coxae brown, all others yellowish white; first pair of legs brownish with nearly black dorsal streaks and white lanceolate hairs on dorsal surfaces of femora and a small prolateral spot on patellae and a white annulus near middle of tibiae and metatarsi; second pair of legs much like first pair but lighter in color; third and fourth pairs yellowish white with dark brown markings the most conspicuous of which are ventral sides of femora and prolateral and retrolateral sides of tibiae and metatarsi. Abdomen: nearly black at base with silvery hairs; just dorsal to this dark area is a narrow white basal band which continues dorsolaterally as a short stripe; extending through central dorsal region is a nearly black stripe containing a small white spot near middle and a short white bar near posterior end; behind the short dorsolateral white stripe are two more white spots just in front of the corresponding dorsal white spots; from the median dark stripe to the dorsolateral white spots the whole dorsum is a bright rust-red; in some males the dorsolateral white stripes connect with the first pair of dorsolateral white spots to make a curved mark which is characteristic of the female; lateral sides almost black; venter white for about half way from genital groove to base of spinnerets, elsewhere nearly black behind genital groove, but in front of it yellowish white with very small dark dots concentrated in middle.

Female. Epigynum with only a slight posterior marginal notch, but with a strongly chitinized lip dorsal to which there appears to be a distinct recess; in anterior half of epigynal plate there is a pair of shallow depressions separated by a low and somewhat wrinkled septum; each depression is bounded posteriorly by a chitinized recurved lip (Fig. 183). Color pattern of female appears to be quite constant, especially on the abdomen, except as the loose white scales are rubbed off.

Type locality. Male hypotype from Canal Zone Biological Area, June, 1939. Many males and females from the following localities: Canal Zone Biological Area, June–July, 1934; July–Aug., 1936; June–Sept., 1939; Arraijan, R. P., Aug., 1936; Porto Bello, R. P., Aug,. 1936; El Valle, R. P., 1936; Madden Dam region, C. Z., Aug., 1939; C. Z. Forest Reserve, Aug., 1939; Balboa, C. Z., Aug., 1936; Ft. Sherman, C. Z., 1939.

Phiale elegans (F. Cambridge), 1901

Cyrene elegans F. Cambridge, 1901
P. elegans Simon, 1903
P. elegans Petrunkevitch, 1911
P. elegans Petrunkevitch, 1925

So far as I can determine this species has not been found in Panama since its description by Cambridge, and it has not yet appeared in my collection.

Phiale flavescens (Peckham), 1896

Pachomius flavescens Peckham, 1896
Cyrene flavescens F. Cambridge, 1901
Phiale flavescens Simon, 1903
P. flavescens Petrunkevitch, 1911
P. flavescens Petrunkevitch, 1925

The type is in the Peckham collection at the Museum of Comparative Zoölogy at Harvard College. Cambridge did not have the species in his collection and, apparently, it has not been taken since Count Keyserling sent the single female to the Peckhams for study. It has not yet appeared in my collection.

Phiale geminata (F. Cambridge), 1901

Cyrene geminata F. Cambridge, 1901
P. geminata Simon, 1903
P. geminata Petrunkevitch, 1911
P. geminata Petrunkevitch, 1925

Cambridge had a single female in poor condition upon which to base the species. Apparently it has not been taken since the date of the original collection. I have already stated that the specimens in the Museum of Comparative Zoölogy now labelled this species are a mixture of *F. demarcata* C. and I. and *F. albosignata* (F. Cambridge). I conclude, therefore, that the species has not been found in Panama since the date of the original collection studied by Cambridge. The species has not yet appeared in my collection.

Phiale interrupta (F. Cambridge), 1901

Figures 184–186

Cyrene interrupta F. Cambridge, 1901
P. interrupta Simon, 1903
C. interrupta Banks, 1909
P. interrupta Petrunkevitch, 1911
P. interrupta Petrunkevitch, 1925
P. delecta Banks, 1929

There seems to be little doubt of the correct identification of the females of this species. Mr. Banks had a male from Costa Rica which he considered to belong with the females from the same locality but he did not describe it. I believe the male from Gamboa, C. Z., identified by Mr. Banks as *P. delecta* (Peckham), is the same as the male from Costa Rica and that both belong with the males which I have collected in several places with females. The remarkable similarity in respect to palpi among the males of the group to which *P. delecta, P. interrupta,* and what F. Cambridge considered *P. aprica* belong will be a disappointment to those who rely chiefly upon palpal features for the separation of species.

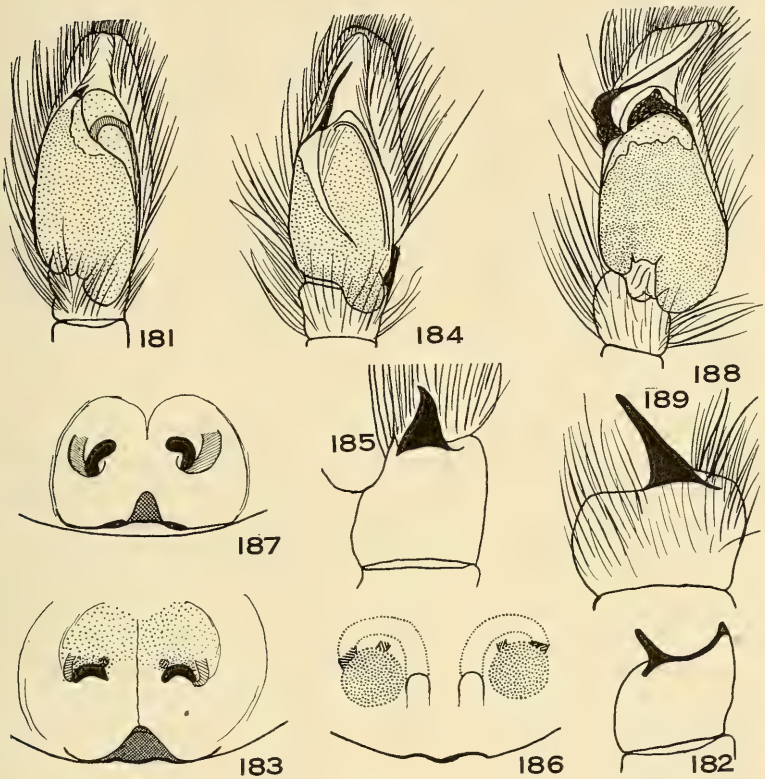
Male allotype. Total length 6.21 mm. Carapace 3.01 mm. long, 2.05 mm. wide a short distance behind PLE which occupy about thirteen fifteenths of the total width of the carapace at their level, 1.41 mm. tall and, therefore, about .69 as tall as wide; descent from PLE gradual until steep posterior declivity which begins about four sevenths of the distance from PLE to posterior border; a short median longitudinal thoracic groove slightly behind PLE.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of AME are only slightly above those of ALE. Anterior row slightly wider than posterior row, wider than middle row in ratio of 54 : 47. Quadrangle of laterals wider than long in ratio of about 11 : 7. Total eye space occupies forty-three eighty-ninths of the length of carapace. Ratio of eyes AME : ALE : PME : PLE = 25 : 13 : 4 : 12. AME contiguous, separated from ALE by one twentieth of their diameter. Middle eyes slightly closer to ALE than to PLE. Height of clypeus equal to two fifths of the diameter of AME. Clypeus decorated by a covering of white lanceolate hairs over its ventral half, a transverse row of eight white bristles through the middle, several other whitish bristles along ventral margin, and three long upturned light brownish bristles in lower angle between AME.

Chelicerae. Parallel, vertical, moderately long; basal segment 1.09 mm. long, basal half somewhat swollen in front and covered with long white hairs. Fang moderately robust, evenly curved. Fang groove distinct; with two promarginal contiguous teeth, the inner small, the outer robust; with a single, fairly robust retromarginal tooth.

Maxillae. Parallel; longer than wide in middle in ratio of 16 : 7; quite concave in middle of outer border; serrula continues over outer distal angle to concavity; with no distinct tubercle or hook on outer distal corner.

Lip. Slightly wider than long; basal excavations reach about one



External Anatomy of Spiders

Figs. 181–182. *Phiale dybowskii*, male palp, ventral view; and palpal tibia, retrolateral view.
Fig. 183. *P. dybowskii*, epigynum, ventral view.
Figs. 184–185. *P. interrupta*, male palp, ventral view; and palpal tibia, retrolateral view.
Fig. 186. *P. interrupta*, epigynum, ventral view.
Fig. 187. *Phiale maculosa* Chickering; epigynum, ventral view.
Figs. 188–189. *P. magnifica*, male palp, ventral view; and palpal tibia, retrolateral view.

third of length of organ; reaches about four sevenths the length of the maxillae. Sternal suture slightly procurved.

Sternum. Elongate scutiform; longer than wide in ratio of 10 : 7; anterior border slightly narrower than base of lip; posterior end very bluntly rounded and not extended between fourth coxae which are separated by nearly one half their diameter. Neither coxae nor trochanters much enlarged or elongated.

Legs. 1342. Tibial index of first leg 12, of fourth leg 15.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.11	1.28	2.05	1.66	.77	7.87
2.	1.53	.96	1.09	.96	.57	5.11
3.	1.66	.95	1.14	1.34	.70	5.79
4.	1.66	.83	1.22	1.41	.64	5.76
Palp	.77	.28	.26	—	.80	2.11

All legs with a moderate supply of hair but with no fringes.

Spines. First leg: femur dorsal 0–1–1–1, prolateral only distal 2; patella only prolateral 0–1–0; tibia only prolateral 1–0–1, ventral 2–1p–2; metatarsus prolateral 0–1, ventral 0–2–2. Second leg: femur and patella as in first except femur retrolateral distal 2; tibia and metatarsus as in first. Third leg: femur as in first except retrolateral 0–0–1–2; patella prolateral and retrolateral 0–1–0; tibia dorsal 1–0–0, prolateral and retrolateral 1–1–1, ventral 0–1p–0–2; metatarsus prolateral 1–1, retrolateral 1–1–2, ventral 2–2. Fourth leg: femur and patella as in second; tibia as in third except ventral 0–2–0–2; metatarsus prolateral and retrolateral 1–2, ventral 0–1p–1r–2. Palpal spines: only femur dorsal 0–1–1–0–1.

Palp. Femur only slightly bent prolaterally; with a small crest of dorsal white hairs on distal half of femur and dorsal side of patella; tibial retrolateral apophysis a simple spur, broad at base, hooked a little toward cymbium distally; bulb moderately swollen, with a retrolateral lobule at base; embolus arises near distal border of bulb and extends as a slender sinuous spine towards distal end of cymbium (Figs. 184–185).

Abdomen. Longer than wide in ratio of about 5 : 3, widest two fifths from base, tapered from there nearly to a point at anal tubercle; spinnerets rather slender but as usual in the genus; position of colulus indicated by a tuft of black hairs; tracheal spiracle near base of spinnerets, with distinct lip but with no tubercle.

Color in alcohol. Carapace: generally brown with many black spots

and streaks; eyes on black spots; a rather heavy coat of black short simple hair; in addition to white hairs on clypeus there are six small white spots as follows: one in region of thoracic groove, one just at beginning of steep posterior declivity, one on each side between PME and PLE, and one at each posterolateral corner; the size of these spots varies considerably in the paratypes partly because of the ease with which the white lanceolate hairs composing them are rubbed off. Legs: all are brownish with femora dark brown, becoming lighter from the first back to fourth, all are lighter dorsally and ventrally; third and fourth femora with a white annulus in the middle. Sternum light yellowish centrally, dark marginally. Chelicerae reddish brown with white hairs on anterior surface. Maxillae and lip brownish with yellowish white tips. Abdomen: dark brown at base; in center at dorsal border of dark base is a small white spot; at each anterolateral corner is a somewhat elongated white spot; a short distance from base is an incomplete obscure narrow recurved bar; near the middle is a broad black bar united behind with another broad black bar which in turn is united with a black central spot just anterior to anal tubercle; the two broad bars enclose a row of four central obscure lighter spots and at sides of this row is a pair of small white spots between the two black bars; the whole dorsal area around these spots and extending dorsolaterally is a deep orange red; laterally yellowish with black spots and short black stripes all overlaid with the orange red which fades out toward ventral side; venter yellowish brown with small irregular black spots through the center bordered by yellowish dots. There is considerable variation in abdominal coloration among paratypes.

Female. A figure of the epigynum has been prepared for comparison with Cambridge's figures (Fig. 186).

Type locality. Male allotype from Canal Zone Biological Area, June, 1934. Paratype males and females from Canal Zone Biological Area, June–July, 1934; July, 1936; June–Sept., 1939; Porto Bello, R. P., Aug., 1936; Madden Dam region, C. Z., Aug., 1936; C. Z. Forest Reserve, C. Z., Aug., 1939.

Phiale maculosa spec. nov.

Figure 187

This is the species identified as *Freya flava* (F. Cambridge) by Mr. Banks ('29). It seems to me to be an undescribed species and I am treating it as such in this study.

Female holotype. Total length 5.89 mm. Carapace 2.62 mm. long,

1.66 mm. wide considerably behind PLE which occupy sixty-three seventy-firsts of the width of the carapace at their level, 1.02 mm. tall and, therefore, about .61 as tall as wide; descent behind PLE slight to steep posterior declivity which begins about two fifths of the distance from PLE to posterior border; a short median longitudinal thoracic groove just behind PLE.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of AME are level with those of ALE. Posterior row wider than anterior row in ratio of 63 : 61, wider than middle row in ratio of 63 : 54. Quadrangle of laterals wider than long in ratio of 63 : 45. Total eye space occupies thirty-six seventy-ninths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 22 : 11 : 2.5 : 10. AME separated from one another by one twenty-second of their diameter, almost contiguous to ALE. Middle eyes slightly closer to ALE than to PLE. Height of clypeus equal to two elevenths of the diameter of AME. Clypeus decorated only with a fringe of whitish bristles, five or six long convergent bristles beneath each AME and two long upturned brownish bristles in lower angle between AME.

Chelicerae. Parallel, vertical; considerably swollen in front beginning near base; basal segment .77 mm. long. Fang fairly robust, evenly curved. Fang groove with two promarginal teeth and a single retromarginal tooth as usual in the genus.

Maxillae. Parallel; longer than wide in middle in ratio of about 5 : 3; moderately dilated distally; only moderately notched in middle of outer border; outer distal angle smoothly rounded, with no tubercle or hook.

Lip. As wide as long; nearly squarely truncated at distal end; basal excavations reach one third of length of organ; reaches just slightly beyond middle of maxillae. Sternal suture gently procurved.

Sternum. Elongate scutiform; longer than wide in ratio of 12 : 7; moderately convex; anterior border considerably narrower than base of lip; posterior end rounded and not extended between fourth coxae which are separated by one sixth of their diameter.

Legs. 4312. Tibial index of first leg 20, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.21	.80	.83	.64	.50	3.98
2.	1.08	.64	.64	.51	.44	3.31
3.	1.34	.70	.83	.96	.54	4.37
4.	1.53	.70	.96	1.08	.51	4.78

All legs with a moderate supply of hair but with no fringes.

Spines. First leg: femur dorsal 0–1–1–1, prolateral only distal 2; patella only prolateral 0–1–0; tibia only prolateral 1–0–1, ventral 2–2–2 (terminal); metatarsus only ventral 2–2. Second leg: femur and patella as in first; tibia and metatarsus as in first except tibia ventral 1r–2–2. Third leg: femur dorsal 0–1–1–1, prolateral 0–0–1–2, retrolateral only distal 1; patella prolateral and retrolateral 0–1–0; tibia prolateral 1–1–1 on right side, 0–1–1 on left side, retrolateral 1–1–1, ventral 0–1p–2–2; metatarsus prolateral 1–2, retrolateral 1–1(offset dorsally)–2, ventral 2–2. Fourth leg: femur and patella as in third except femur prolateral distal 1; tibia prolateral and retrolateral 1–1–1, ventral 0–1p–2–2; metatarsus prolateral and retrolateral 1–1–2, ventral 0–2–2. Palpal spines: a row of about six small dorsal femorals.

Abdomen. Almost oval in outline; longer than wide in ratio of 52 : 29; widest near middle; anal tubercle a short white flattened cone with a tuft of yellowish hairs; spinnerets as usual in the genus; position of colulus as usual marked by a tuft of black hairs; tracheal spiracle near base of spinnerets, hardly discernible.

Epigynum. Posterior margin with a shallow notch, but an opening dorsal to lip passes into a recess which causes the notch to appear deeper than it actually is; plate somewhat wider than long; central part of plate contains two shallow depressions where two curved structures meet and fit into one another (Fig. 187).

Color in alcohol. Carapace: whole ocular area black with whitish hairs scattered over its surface; two indefinite black stripes diverge from beginning of steep posterior declivity to posterior border; a very narrow black line along ventral margin; elsewhere amber with black dots and some black hair. Legs and mouth parts light amber; first pair of legs with indefinite prolateral and retrolateral dusty stripes. Abdomen: a blackish bar at base continues as a narrow lateral stripe; dorsal to the black basal bar is a whitish bar which continues dorsolaterally as a definite white stripe nearly to posterior end; extending from base to near posterior end is a dorsal central whitish stripe narrow at first but suddenly widened at posterior end into a narrow bar just anterior to the black tip of the abdomen; dorsal regions between the central white stripe and the white dorsolateral stripes are taken up by two nearly black stripes overlaid with rust-red hairs (if red hairs are rubbed off, as they nearly always are to some extent, the stripes are black); venter yellowish white with a broad, somewhat U-shaped black figure procurved in the posterior three fifths.

Type locality. Female holotype from Canal Zone Biological Area,

July, 1939; many paratypes from the same locality: June–July, 1934; June, Aug., 1936; July–Aug., 1939.

Phiale magnifica (Banks), 1909

Figures 188–191

Cyrene magnifica Banks, 1909
P. magnifica Petrunkevitch, 1911
P. magnifica Banks, 1929

Banks ('09) described this large and beautiful species from females alone, collected in Costa Rica. He collected males and reported the species from the Canal Zone Biological Area, July, 1924, but the males have remained undescribed up to the present time. A detailed description of the allotype male together with pertinent data on the females seem to be quite worth while in this paper.

Male allotype. Total length 11.84 mm. Carapace 5.90 mm. long, 4.48 mm. wide considerably behind PLE which occupy twenty-three thirtieths of the total width of the carapace at their level, 2.56 mm. tall and, therefore, .57 as tall as wide; quite regularly arched dorsally from AME to steep posterior declivity which begins about two thirds of the distance from PLE to posterior border; rounded laterally, especially from opposite PLE; lateral sides definitely slant outward from dorsal margin toward ventral margin; with a short median longitudinal thoracic groove just behind PLE; covered with a copious growth of short black hair and slender lanceolate white hair forming the white marks to be recorded later.

Eyes. Anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one sixth of the diameter of ALE. Posterior row wider than anterior row in ratio of 45 : 43, wider than middle row in ratio of 9 : 8. Quadrangle of laterals wider than long in ratio of about 3 : 2. Total eye space occupies seven eighteenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 27 : 13 : 3.5 : 11.5. AME nearly contiguous, separated from ALE by one ninth of their diameter. Middle eyes closer to ALE than to PLE in ratio of 3 : 4. Height of clypeus equal to one third the diameter of AME. Clypeus decorated with five or six long bristles beneath each AME, all but the medial one black, that one white, three long upturned bristles in lower angle between AME, and a few long white lanceolate hairs and a few white bristles along margin.

Chelicerae. Vertical, parallel, fairly robust, rounded in front; basal

segment 2.37 mm. long; with well developed basal boss. Fang stout at base, evenly curved, robust. Fang groove distinct; with two teeth on promargin, contiguous and united at base; a single robust retromarginal tooth about half way from base of fang to medial end of groove.

Maxillae. Parallel; longer than wide in middle in ratio of about 3 : 2, outer border acutely notched in middle; outer distal corner nearly a right angle but without tubercle or hook.

Lip. Slightly longer than wide; basal excavations reach only about one fourth of length of organ; reaches to middle of maxillae; margins gently rounded to narrow distal border. Sternal suture gently procurved.

Sternum. Elongate scutiform; longer than wide in ratio of 35 : 23; widest between second coxae; anterior border narrower than base of lip; posterior end blunt and not extended between fourth coxae which are separated by a little more than one third of their width. No coxae notably enlarged or elongated.

Legs. 1432. Tibial index of first leg 15, of fourth leg 16.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	3.97	2.36	3.71	3.07	1.79	14.90
2.	3.26	1.85	2.23	1.98	1.15	10.47
3.	3.58	1.79	2.05	2.69	1.21	11.32
4.	3.64	1.73	2.56	3.14	1.34	12.41
Palp	1.60	.58	.40	—	1.73	4.31

First leg not enlarged. All legs with a copious supply of hair. First and second legs might be considered to have a moderately well developed fringe on ventral sides of patellae, tibiae and metatarsi.

Spines. First leg: femur dorsal 0–1–1–1, prolateral only distal 2, retrolateral 0–1–2; patella only prolateral 0–1–0; tibia only prolateral 1–0–1, ventral 2–2–2; metatarsus only ventral 0–2–2. Second leg: femur dorsal 0–1–1–1–1–1, elsewhere as in first; patella as in first; tibia prolateral 1–1, retrolateral 1–0, ventral 2–0–2–2 (terminal); metatarsus prolateral and retrolateral 0–1, ventral 2–2. Third leg: femur dorsal 0–1–1–1, prolateral and retrolateral 0–0–1–2; patella prolateral and retrolateral 0–1–0; tibia only prolateral 1–1(offset dorsally)–1, retrolateral 1–1–1, ventral 2–0–2; metatarsus prolateral and retrolateral 1–1–2, ventral 0–2–2. Fourth leg: femur and patella as in third except femur retrolateral only distal 2; tibia and metatarsus as in third. Palpal spines: only femur dorsal 1–1–1 plus two other small dorsal distal spines beneath the white hair.

Palp. Femur only slightly bent, somewhat enlarged in distal half, with a patch of white lanceolate hairs on prolateral and dorsal surfaces of distal half; both patella and tibia short with latter about two thirds as long as former; both distal end of tibia and adjacent proximal end of cymbium covered by a dorsal band of white lanceolate hairs; tibial retrolateral apophysis a long spur, stout at base and gradually tapered to a point distally; bulb much swollen, bilobed at base, the robust lobe overlaps tibia largely; embolus arises on prolateral side of distal end of bulb, turns at a right angle and extends across the cymbium almost to its distal end (Figs. 188–189).

Abdomen. Ovoid, longer than wide in ratio of about 12 : 7, widest about two fifths from base; anal tubercle a short flattened cone without special hairs; spinnerets quite ordinary, inconspicuous for such a large spider; position of colulus indicated by a large tuft of black hairs; tracheal spiracle near base of spinnerets, without tubercle or prominent lip.

Color in alcohol. Carapace: dark reddish brown in general; with a pair of broad white marginal stripes from opposite PLE to posterolateral corners, and a small white central spot between PLE, all white marks made by presence of white lanceolate hairs. Legs: all legs reddish brown with white markings; first and second pairs with white dorsal surfaces on femora and patellae, and white dorsal patches near the middle of tibiae and metatarsi; third and fourth pairs with white dorsal patches near middle of femora and near proximal ends of patellae, tibiae and metatarsi. Sternum and coxae all dark reddish brown, sometimes almost black. Chelicerae, lip, and maxillae dark reddish brown or black, the latter with whitish tips. Abdomen: almost black with white markings; extending through central region is a row of four white spots, the first is an elongated slender stripe about one third the length of the abdomen, then follow two small spots, with a short bar behind these and just anterior to the posterior end; dorsolaterally on each side is a row of three white spots, the basal one is a short narrow stripe, the second a short bar, and the third a rounded spot; remainder of lateral sides and venter black with yellowish dots. Only minor variations have been noted in the color pattern of paratypes.

Female. Color in alcohol. The female was originally described as possessing white markings and even now the Costa Rican specimens appear to be so colored. But in my Panamanian specimens females are usually marked with bright yellow. The clypeus and basal halves of the chelicerae are covered with white lanceolate hairs; carapace with five conspicuous stripes, a central stripe and a pair of broad marginal

yellow stripes with a pair of nearly black dorsolateral stripes; abdomen with a yellow basal spot and a black band just above it which extends laterally to join the black areas of those regions; the central row of four spots and the three spots on each side which appear in the male are much the same in the female except that the first two dorsolateral spots are united across the basal end and also with the first of the central row; the venter has four yellow stripes and three nearly black stripes occupying the central region with a pair of yellow spots near the middle at the sides of the stripes.

Epigynum. Posterior margin without notch; with a recurved lip a short distance in front of posterior margin and a distinct narrow recess; central part of plate occupied by two large depressions each with a central raised part bordered by a spiral boundary (Fig. 190). The organ only shows well in females just after they have become mature. Older specimens have the epigynum more or less covered and obscured by a gummy secretion thus giving a very deceptive appearance to the structure (Fig. 191).

Type locality. Male allotype from Canal Zone Biological Area, July, 1939. Many paratypes and females from the following localities: Canal Zone Biological Area, June–July, 1934; June–Aug., 1936; June–Sept., 1939; Jan.–Feb., 1940; Madden Dam region, C. Z., Aug., 1936; C. Z. Forest Reserve, C. Z., July, 1939; Gamboa, C. Z., Aug., 1939; France Field, C. Z., Aug., 1939; Ft. Sherman, C. Z., Aug., 1939.

Phiale mimica (C. Koch), 1846

Figures 192–196

Plexippus mimicus C. Koch, 1846
Phiale gratiosa C. Koch, 1846
Phiale gratiosa Taczanowski, 1878
Philia gratiosa Bertkau, 1880
Pardessus mimicus Peckham, 1896
P. graciosus Peckham, 1896
P. mimicus F. Cambridge, 1901
P. graciosus F. Cambridge, 1901
Phiale mimicus Simon, 1903
P. mimicus Simon, 1903
P. gratiosa Petrunkevitch, 1911
P. mimica Petrunkevitch, 1911
P. gratiosa Petrunkevitch, 1925
P. mimica Petrunkevitch, 1925

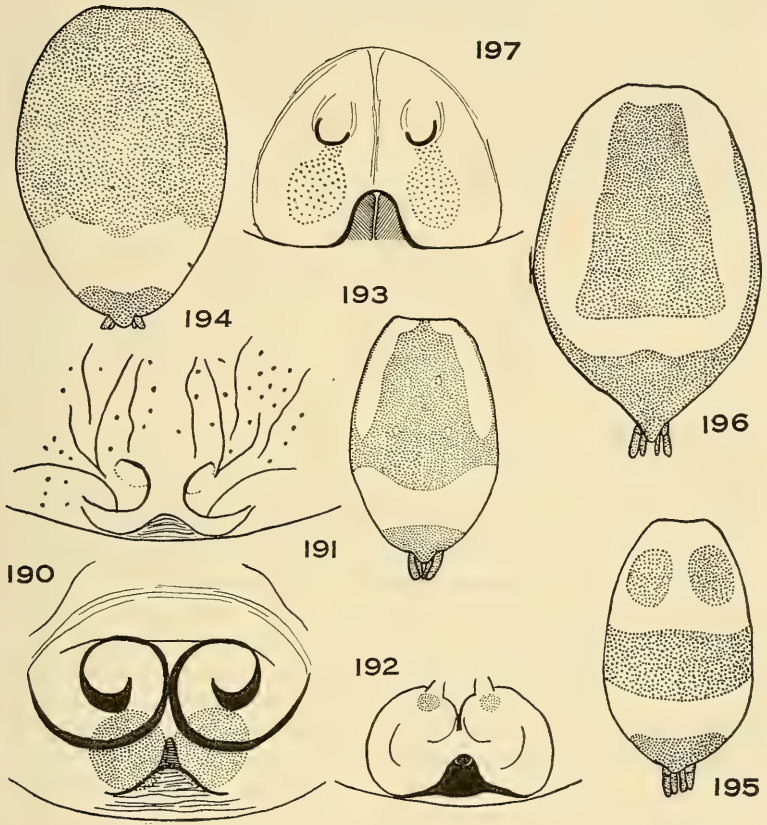
I have specimens in my collection which illustrate the typical color patterns of both *P. mimica* and *P. gratiosa* as well as several with intermediate patterns. The color itself is almost as variable as the pattern; apparently it can be red or yellow or some intermediate color, or a combination of yellow and red with black. I have carefully examined several of these with different color patterns and I can find no significant differences in the fundamental structures, hence I do not hesitate to throw them together as indicated above. It would not be surprising to find that *P. crocea* C. Koch from Brazil belongs to the same species. In fact, I have specimens which would probably be referred to that species by the older taxonomists. Some of the more frequent color patterns on the abdomens are represented in Figures 193–196; blank spaces are red or yellow and dotted areas black. Males are unknown.

Female hypotype. Total length 7.74 mm. Carapace 3.64 mm. long, 2.53 mm. wide just behind PLE which occupy thirty-five thirty-eighths of width of carapace at their level, 1.73 mm. tall and, therefore, about .68 as tall as wide; descent very gradual from PLE to steep posterior declivity which begins about half way from PLE to posterior border; with a rich coat of hair to be recorded later; with a short median longitudinal groove beginning just even with posterior borders of PLE.

Eyes. Anterior row recurved so that dorsal borders of AME are level with those of ALE. Anterior row and posterior row of equal width, both wider than middle row in ratio of 31 : 27. Quadrangle of laterals wider than long in ratio of about 3 : 2. Total eye space occupies five elevenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 29 : 14 : 4 : 13. AME separated from one another by one tenth of their diameter, from ALE by slightly less. Middle eyes slightly closer to ALE than to PLE. Height of clypeus equal to about one third of the diameter of AME. Clypeus decorated only with a ventral fringe of slender and weak bristles and a few longer stronger bristles, five or six long brown bristles beneath each AME, and three long upturned bristles in lower angle between AME.

Chelicerae. Parallel, vertical; considerably swollen in front near medial border where there are long, stiff, distally curved brown bristles; basal segment 1.15 mm. long. Fang robust, evenly curved. Fang groove distinct; with two promarginal teeth as usual; a single robust retromarginal tooth.

Maxillae. Parallel; longer than wide in middle in ratio of about 8 : 3; moderately notched in middle of outer border; outer distal angle well rounded, with no tubercle or hook; palp inserted into proximal third. With many stiff brown bristles on posterior surface.



External Anatomy of Spiders

Fig. 190. *Phiale magnifica*, epigynum, ventral view, normal.
Fig. 191. *P. magnifica*, epigynum, ventral view, after secretion of gummy product.
Fig. 192. *Phiale mimica*, epigynum, ventral view.
Fig. 193. *P. mimica*, dorsum of abdomen, gratiosa pattern.
Figs. 194, 196. *P. mimica*, variations in dorsal color pattern.
Fig. 195. *P. mimica*, dorsum of abdomen, mimica pattern.
Fig. 197. *Phiale orvillei*, epigynum, ventral view.

Lip. Somewhat wider than long, but presence of many stiff bristles prevents a clear view of organ. Sternal suture procurved.

Sternum. Elongate scutiform; longer than wide in ratio of 65 : 43, widest between second coxae; moderately convex; with many yellowish bristles; posterior end squarely truncated, not extended between fourth coxae which are separated only by about one seventh of their width. Fourth coxae somewhat the longest and first are somewhat the stoutest, none is notably enlarged or elongated.

Legs. 4312. Tibial index of first leg 23, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.79	1.02	1.21	.90	.66	5.58
2.	1.79	1.15	1.05	.90	.65	5.52
3.	2.22	1.22	1.28	1.66	.70	7.08
4.	2.36	1.15	1.73	2.01	.76	8.01

All legs with a moderate amount of hair but with no fringes.

Spines. First leg: femur dorsal 0–1–1–1, prolateral only distal 2; patella 0; tibia only prolateral 1–0–1, ventral 2–2–2; metatarsus only ventral 0–2–2. Second leg: femur and patella as in first except femur retrolateral 0–0–1–2; tibia and metatarsus as in first except tibia ventral 1r–2–2. Third leg: femur dorsal 0–1–1–1, prolateral 0–0–1–2, retrolateral only distal 1; patella prolateral and retrolateral 0–1–0; tibia prolateral and retrolateral 1–1–1, ventral 0–1p–2; metatarsus prolateral 1–1, retrolateral 1–1–2, ventral 0–2–2. Fourth leg: femur and patella as in third except femur prolateral only distal 1; tibia as in third; metatarsus prolateral 1–2, retrolateral; 0–1(offset dorsally)–2, ventral 0–2. Palpal spines: only femur dorsal distal 1.

Abdomen. Broadly oval in outline, longer than wide in ratio of 63 : 43, widest in middle; covered by a rich coat of black and yellow hair as noted under color; anal tubercle and spinnerets as usual in the genus; position of colulus indicated by a relatively large area covered with black bristles; tracheal spiracle near base of spinnerets, with distinct lip but no tubercle.

Epigynum. The conspicuous marginal notch opens into a recess dorsal to lip; main part of plate consists of two large and rather deep depressions separated by a distinct but short septum; each large depression has a smaller depression at its anterior end and each of these is usually filled by a hard gummy secretion; at least one of Cambridge's figures appears to have been made from an immature specimen (Fig. 192).

Color in alcohol. As already noted, the color and pattern are extremely variable in this species. I have chosen a specimen for the hypotype which comes close to that illustrated by C. Koch in his Fig. 1173. Carapace: dark brown except for a procurved deep yellow, almost golden, band beginning at PME and extending posterior to and below PLE and over practically the entire dorsal thoracic region, and a narrow, deep yellow marginal stripe from opposite the palps to the posterolateral corner. Palp: femora brown, tarsi yellowish brown, patellae and tibiae yellowish white. Legs: all coxae with yellow lanceolate hair dorsally; all femora brown with yellow hair on prolateral and retrolateral surfaces; all patellae and tibiae yellowish brown (but not because of presence of yellow hair); all metatarsi the same but with much yellow hair; all tarsi dark brown. Chelicerae reddish brown; lip and maxillae the same with yellowish white tips. (Sternum dark brown with lighter margin. Abdomen: black base extends laterally for about two fifths of length of abdomen; covering the anterior dorsal region for about two fifths of its length is a large bright yellow spot enclosing two angular black spots; across the middle is a broad black band followed by a yellow band about half as wide; the posterior end is entirely black; the anterior and posterior pair of spinnerets are a dusty black with middle pair yellowish white; venter generally black, just behind genital groove is a yellow band, the ventral part of the large yellow dorsal spot.

Type locality. Female hypotype from France Field, C. Z., Aug., 1939. Other females from the following localities: Canal Zone Biological Area, June–July, 1934; June, 1936; June–Sept., 1939; July, 1943–March, 1944: Ft. Randolph, C. Z., Aug., 1936; Balboa, C. Z., Aug., 1936; C. Z. Forest Reserve, C. Z., Aug., 1939; La Campana, R. P., May–June, 1939.

Phiale niveo-guttata (F. Cambridge), 1901

Cyrene niveo-guttata F. Cambridge, 1901
P. niveo-guttata Simon, 1903
P. niveo-guttata Petrunkevitch, 1911
P. niveo-guttata Petrunkevitch, 1925

Cambridge had both sexes from Panama but the species has not been reported since that time, and it has not yet appeared in my collections.

Phiale orvillei spec. nov.

Figure 197

It is possible that this species is really *Phiale flava* (F. Cambridge). There are some features about it which certainly point in that direction and others which make it improbable. In view of the uncertainty I have chosen to describe it as new to science. If it is later shown to be that species then my specimen will become the hypotype. A detailed description is much needed in any case.

Female holotype. Total length 8.19 mm. Carapace 3.39 mm. long, 2.56 mm. wide just behind PLE which occupy thirty-one thirty-ninths of total width of carapace at their level, 1.53 mm. tall and, therefore nearly .60 as tall as wide; descent gradual but at an angle of about fifteen degrees to steep posterior declivity which begins just beyond the halfway point from PLE to posterior border; with a short median longitudinal thoracic groove immediately posterior to PLE; with a rich coat of hair to be detailed under color.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of ALE are slightly below those of AME. Posterior row slightly wider than anterior row, wider than middle row in ratio of 29 : 26. Quadrangle of laterals wider than long in ratio of 29 : 18. Total eye space occupies fifteen thirty-fourths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 27 : 14 : 3.5 : 12. AME nearly contiguous, separated from ALE by one seventh of their diameter. Middle eyes either slightly closer to ALE or equidistant from ALE and PLE. Height of clypeus equal to one third of the diameter of AME. Clypeus decorated with a ventral fringe of whitish bristles, an irregular transverse row of ten or twelve long whitish bristles near the middle, a central cluster of lanceolate white hairs beneath and between AME, and three long upturned brownish bristles in lower angle between AME. AME surrounded by lanceolate hair, red above and below, white elsewhere. Beneath and posterior to ALE white and reddish lanceolate hair arranged in alternate rows giving a striated effect, four white rows and three reddish rows, the white hair partially erect; the topmost white row is least apparent and least erect.

Chelicerae. Vertical, parallel; strongly swollen near base in front; with prominent basal boss; with long yellowish bristles along medial surface in front; basal segment 1.28 mm. long. Fang robust, evenly curved. Fang groove distinct; with two promarginal and a single retromarginal tooth as usual.

Maxillae. Parallel; somewhat dilated distally; longer than wide in

middle in ratio of about 16 : 11; only moderately notched in middle of outer border. Largely hidden by first coxae.

Lip. Longer than wide in ratio of about 5 : 4; basal excavations reach about two fifths of length of organ; reaches to about middle of maxillae. Sternal suture gently procurved.

Sternum. Longer than wide in ratio of about 3 : 2; with a distinct lobe for each coxa; moderately convex, with a low secondary convexity for each coxa; anterior border considerably narrower than base of lip; posterior end squarely truncate and not extended between fourth coxae which are separated by about one sixth of their width; coxae distinctly excavated and set out over sternum.

Legs. 4312. Tibial index of first leg 21, of fourth leg 16.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.63	1.06	1.15	.96	.64	5.44
2.	1.66	1.00	1.02	.90	.64	5.22
3.	1.92	1.08	1.15	1.41	.70	6.26
4.	1.98	1.02	1.30	1.54	.70	6.54

All legs with a moderate supply of hair but with no fringes.

Spines. First leg: femur dorsal 0–1–1–1, prolateral only distal 2, retrolateral only distal 1; patella only prolateral 0–1–0; tibia only prolateral 1–1, ventral 2–2–2 (terminal); metatarsus only ventral 2–2. Second leg: femur and patella as in first except femur retrolateral distal 2; tibia and metatarsus as in first except tibia ventral 1r–2–2. Third leg: femur dorsal 0–1–1–1, prolateral 0–0–1–2, retrolateral only distal 1; patella prolateral and retrolateral 0–1–0; tibia prolateral and retrolateral 1–1–(offset dorsally)–1, ventral 1p–0–2; metatarsus prolateral 1–2, retrolateral 1–1–2, ventral 2–2. Fourth leg: femur dorsal 0–1–1–1, retrolateral distal 1; patella and tibia as in third; metatarsus prolateral and retrolateral 1–1–2, ventral 0–2–2. Palpal spines: only femur dorsal distal 1.

Abdomen. Ovoid, longer than wide in ratio of 76 : 49, widest in the middle; anal tubercle a short cone with a tuft of black hairs; spinnerets as usual in the genus; position of colulus indicated by a tuft of black hairs; tracheal spiracle near base of spinnerets, with an indistinct lip but with no tubercle.

Epigynum. Posterior marginal notch with a deep recess; central part of epigynal plate swollen and with two small openings with procurved chitinized margins; openings nearly twice the diameter of one of them apart (Fig. 197).

Color in alcohol. Carapace: probably with a whitish stripe from AME to posterior border, narrowed between PLE and in middle of steep posterior declivity; on each side embracing lateral eyes and also PME is a broad reddish brown stripe with some rust-red lanceolate hairs around eyes and black hair behind PLE; lateral sides whitish from presence of lanceolate hairs over yellowish background with small brown spots in posterior three fifths; ventral margin with a narrow brownish line; region beneath ALE as already described. Legs and palps light yellowish white or light amber with a few obscure brownish spots. Chelicerae amber color. Maxillae and lip amber with whitish tips. Sternum amber with a brownish marginal spot opposite each coxa. Abdomen: yellowish base continues through dorsal central region as a broad stripe, widest in middle, to anal tubercle; in posterior half of central stripe appear light orange chevrons and probably in life they extend throughout the central stripe; on each side of central stripe is a broad stripe distinctly darker orange in general color but with many black hairs; dorsolaterally near lateral margins are small brownish spots; laterally yellowish white with an occasional small black spot; venter blackish and separated vaguely into three stripes; spinnerets brownish.

Type locality. Female holotype from El Valle, R. P., July, 1936. No paratypes.

Phiale pallida (F. Cambridge), 1901

Figure 198

Cyrene pallida F. Cambridge, 1901
P. pallida Petrunkevitch, 1911

Formerly known only from Guatemala. I have eight specimens which I believe belong here, but the species will probably be combined with another when the sexes have been more completely and accurately matched as only females are known. Cambridge believed the species to be closely related to *Freya prominens* (F. Cambridge).

Female hypotype. Total length 9.47 mm. Carapace 3.84 mm. long, 2.88 mm. wide at level of PLE which occupy thirty-eight forty-fifths of the total width of the carapace at their level, 2.11 mm. tall and, therefore, .73 as tall as wide; with well developed coat of light and dark hair; with a low swelling dorsal to PLE and another dorsal and anterior to PME; with a short median longitudinal thoracic groove just behind PLE.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of AME are level with those of ALE. Anterior row wider than posterior row in ratio of 20 : 19, wider than middle row in ratio of 8 : 7. Quadrangle of laterals wider than long in ratio of 20 : 13. Total eye space occupies sixteen twenty-ninths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 36 : 21 : 4 : 19. AME separated from one another and from ALE by about one twelfth of their diameter. Middle eyes closer to PLE than to ALE in ratio of about 5 : 6. Height of clypeus equal to one fourth of the diameter of AME. Clypeus decorated with a ventral fringe of white bristles, five long convergent whitish bristles beneath each AME, and three long upturned brownish bristles in lower angle between AME. Each AME is surrounded by lanceolate hairs all of which are white except along a median sector and an outer sector where they are reddish.

Chelicerae. Extremely swollen close to base; parallel, vertical; with long white hair scantily distributed over front surface. Fang robust, evenly curved. Fang groove distinct; with the two promarginal teeth as usual; a single, fairly robust, retromarginal tooth closer to base of fang than to medial end of groove.

Maxillae. Parallel; longer than wide in ratio of about 15 : 8; outer margin only moderately notched in middle; outer distal angle well rounded, with no tubercle or hook.

Lip. Longer than wide in ratio of about 6 : 5; basal excavations reach about two fifths of length of organ; reaches about three fifths the length of maxillae. Sternal suture gently procurved.

Sternum. Almost parallel-sided from interval between first and second coxae to that between third and fourth coxae; longer than wide in ratio of 8 : 5; widest between intervals named above; anterior border considerably narrower than base of lip; posterior end squarely truncated and not extended between fourth coxae which are separated by nearly one third of their diameter. All coxae excavated ventrally at their bases, especially the first and second.

Legs. 4312. Tibial index of first leg 19, of fourth leg 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.95	1.48	1.54	1.22	.78	6.97
2.	1.92	1.41	1.28	1.10	.72	6.43
3.	2.50	1.30	1.41	1.85	.64	7.70
4.	2.55	1.26	1.79	2.05	.77	8.42

All legs with a moderate supply of hair. Third and fourth femora with an unusual amount of erect yellowish hair on ventral sides.

Spines. First leg: femur dorsal 0–1–1–1, prolateral only distal 2; patella 0; tibia only prolateral 0–0–1, ventral 2–2–2; metatarsus only ventral 0–2–2. Second leg: femur and patella as in first except femur retrolateral distal 1; tibia only prolateral 1–0–1, ventral 1r–2–2; metatarsus as in first. Third leg: femur dorsal 0–1–1–1, prolateral 0–0–1–2, retrolateral only distal 1; patella prolateral and retrolateral 0–1–0; tibia prolateral and retrolateral 1–1–1, ventral 0–1p–2; metatarsus prolateral 1–2, retrolateral 1–1–2; ventral 0–2–2. Fourth leg: femur dorsal 0–1–0–1–1, prolateral and retrolateral distal 1; patella and tibia as in third; metatarsus prolateral 1–1–2, retrolateral 0–1–2, ventral 2–2. No palpal spines observed.

Abdomen. Ovoid; longer than wide in ratio of about 2 : 1; widest about one third from base; anal tubercle a very short, flattened cone with a tuft of whitish hair; spinnerets as usual in the genus; position of colulus indicated by a large chitinized area covered by short stiff light hair; tracheal spiracle near base of spinnerets, with distinct lip but with no tubercle.

Epigynum. Epigynal plate nearly square; posterior margin very shallowly notched where there is an obscure recess dorsal to lip; a short distance in front of this region is a pair of somewhat pyriform spermathecae; still farther anterior is a pair of small openings with procurved margins (Fig. 198).

Color in alcohol. In general, Cambridge's description holds for my specimens. Carapace: generally bright reddish brown, eyes on black spots; interocular area with scattered whitish lanceolate hairs; a poorly defined central whitish stripe from anterior borders of PLE and extends back to posterior border, but the hairs covering this region are very easily rubbed off with alteration of the color pattern; a broad marginal whitish stripe begins beneath ALE and extends to posterior border to connect with central dorsal stripe; also a few scattered white lanceolate hairs elsewhere over the reddish brown areas. Chelicerae reddish brown; lip and maxillae lighter with whitish tips. Sternum and coxae amber color. Legs: first and second pairs of femora with distal two thirds brown, elsewhere yellowish white; third and fourth femora brown at both ends, yellowish white in middle; all tarsi yellowish white; other segments spotted and annulated with reddish brown and yellowish white. Abdomen: yellowish spotted with brown at base and along lateral sides; extending through central region is a series of four light colored spots, the third spot is a broad chevron-shaped bar distinctly white at lateral ends; bordering the central light spots are dark brownish spots, difficult to describe because of irregularities; venter yellowish with small brown dots.

Type locality. Female hypotype from Canal Zone Biological Area, Aug., 1936. Seven other females from the same locality: July–Aug., 1936; Madden Dam Region, C. Z., Aug., 1939.

Phiale panamae Chamberlin, 1916

Figures 199–200

P. panamense Petrunkevitch, 1925
P. panamense Banks, 1929

This species was based on a male reported from Panama without specific locality. Mr. Banks had two males from Bella Vista, R. P., Aug., 1924, and one male from Red Tank, C. Z., July, 1924. I have not yet collected the species but it is included in the keys. *Phiale donaldi* sp. nov. is evidently closely related to this species. Some will probably consider them the same, but there are several good differences. The length of the largest of the four specimens of this species in the Museum of Comparative Zoölogy is 4.35 mm. The carapace appears to have a light spot between ALE; a dorsal dark band occupies the posterior half of the quadrangle of lateral eyes; a light stripe extends from between PLE to near the posterior border; a dorsolateral light stripe extends on each side from ALE to near the posterior border. The abdomen has three pale spots in a triangle near the middle of the dorsum; in the posterior fourth are four small white spots, each made by a patch of lanceolate hairs. Nearly the whole dorsum is more or less covered also by light rust-red hairs in unrubbed specimens. The tibial retrolateral apophysis (Figs. 199–200) is a robust spur, strongly curved toward base of cymbium which is excavated to receive it. The bulb and embolus are closely similar to those of *P. donaldi* sp. nov.

Phiale pratensis (Peckham), 1885

Hyllus pratensis Peckham, 1885
Cytaea concinna Peckham, 1885
Cyrene pratensis F. Cambridge, 1901
Phiale pratensis Simon, 1903
P. pratensis Petrunkevitch, 1911

Both sexes are strikingly beautiful animals. The species deserves careful study with the establishment of hypotypes and the publication of complete descriptions. The males, especially, show several features not ordinarily associated with Phiale.

Formerly known from Mexico, Guatemala, Costa Rica, and Trinidad. I have both sexes from the following localities: Canal Zone Biological Area, June–July, 1934; June–Aug., 1936; June–Aug., 1939; Ft. Randolph, C. Z., Aug., 1936; Ft. Sherman, C. Z., Aug.., 1939; El Valle, R. P., July, 1936.

Phiale simplicicava (F. Cambridge), 1901

Cyrene simplicicava F. Cambridge, 1901
P. simplicicava Simon, 1903
P. simplicicava Petrunkevitch, 1911
P. simplicicava Petrunkevitch, 1925
P. simplicicava Banks, 1929

Professor Petrunkevitch published a detailed description of the female ('25). The male is still not known. Mr. Banks suggested that the male might be *Freya bifurcata* (F. Cambridge). Collected from the following localities: Canal Zone Biological Area, June–July, 1934; July–Aug., 1936; June–Aug., 1939; France Field and Ft. Sherman, C. Z., Aug., 1939; Boquete, R. P., July, 1939.

Genus Plexippus C. Koch, 1850

Plexippus paykulli (Audouin), 1827

Attus paykulli Audouin, 1827
Plexippus ligo C. Koch, 1846
Hasarius paykulli Simon, 1876
Menemerus paykulli Peckham, 1888
Thotmes paykulli F. Cambridge, 1901
P. paykulli Simon, 1903
P. paykulli Peckham, 1909
P. paykulli Petrunkevitch, 1911
P. paykulli Petrunkevitch, 1925
P. paykulli Petrunkevitch, 1930

Professor Petrunkevitch gave a detailed description of the male ('30) and added notes on the structure of the female. The species is considered as cosmopolitan tropical. It has been known under many names, of which I have cited only the most important. Mr. Banks ('29) had a specimen from Taboga Island and I have a female from Ft. Randolph, C. Z., Aug., 1936.

Genus Sidusa Peckham, 1895

Sidusa recondita Peckham, 1896

S. recondita F. Cambridge, 1901
S. recondita Simon, 1903
S. recondita Petrunkevitch, 1911
S. recondita Petrunkevitch, 1925
S. recondita Banks, 1929

Sidusa recondita Peckham is placed by Simon among the fissidentate forms. This is an error and should be corrected. *S. recondita* is definitely a unidentate form. *S. gratiosa* Peckham, on the other hand, is a fissidentate form. Like so many other genera among the Salticidae, Sidusa should be critically studied to determine more accurately its natural boundaries.

A common species in most of the regions in Panama where I have collected. Many specimens from the following localities: Canal Zone Biological Area, June–July, 1934; June–Aug., 1936; June–August, 1939; Porto Bello, R. P., Aug., 1936; Ft. Randolph, Ft. Davis, and Balboa, C. Z., Aug., 1936; Ft. Sherman, C. Z., Aug., 1939.

Jollas Group

Genus Jollas Simon, 1901

Jollas minutus spec. nov.

Figures 201–205

It is very difficult, probably impossible, for me to place this little spider in its proper position in the system at this time. It is tentatively placed here awaiting further knowledge.

Male holotype. Total length 1.84 mm. Carapace .98 mm. long, .71 mm. wide at PLE which occupy the full width of the carapace, .50 mm. tall and, therefore, .70 as tall as wide; ascent from AME to PLE gradual but considerable; descent from PLE a gentle arch to beginning of steep posterior declivity which lies about half way from PLE to posterior border; lateral sides of cephalic portion vertical and nearly parallel; median longitudinal thoracic groove doubtful (Figs. 201–202).

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one tenth of diameter of AME. Anterior row and posterior row of equal width, both wider than middle row in ratio of 33 : 29. Quadrangle of laterals wider than long

in ratio of 3 : 2. Total eye space occupies twenty-five forty-thirds of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 10.5 : 6 : 1.25 : 6. AME contiguous to one another and to ALE. Middle eyes closer to PLE than to ALE in ratio of about 2 : 3. Clypeus receding, with vertical height equal to about one fifth of the diameter of AME. Clypeus decorated with a band of white lanceolate hairs which pass from side to side between ALE, and three long upturned brownish bristles in lower angle between AME.

Chelicerae. Vertical, parallel; simple, without special modifications except in regard to teeth; basal segment .26 mm. long. Fang of moderate size, evenly curved. Fang groove indistinct; promargin with three teeth, all near medial end of groove; retromargin probably to be regarded as devoid of teeth (actually there is a very small low cusp or ridge which may represent an obsolescent tooth (Fig. 203).

Maxillae. Slightly convergent; longer than wide in middle in ratio of about 5 : 3; only slightly concave in middle of outer border; outer distal corner well rounded, without tubercle or hook.

Lip. Wider than long in ratio of 7 : 6; basal excavations reach a little more than one third of length of organ; reaches a little beyond middle of maxillae. Sternal suture gently procurved.

Sternum. Scutiform; strongly convex; longer than wide in ratio of 9 : 7; widest between second coxae, but first coxae almost as far apart as second; anterior border a little wider than base of lip; posterior end a blunt point not extended between fourth coxae which are separated by one third of their diameter. Both first and second coxae somewhat enlarged and stouter than others.

Legs. 1432. Tibial index of first and fourth legs 15.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.45	.29	.37	.30	.27	1.68
2.	.43	.20	.27	.23	.24	1.37
3.	.40	.20	.30	.23	.26	1.39
4.	.53	.23	.36	.30	.26	1.68
Palp	.27	.15	.10	—	.27	.79

All legs with a moderate supply of hair but with no special fringes or tufts.

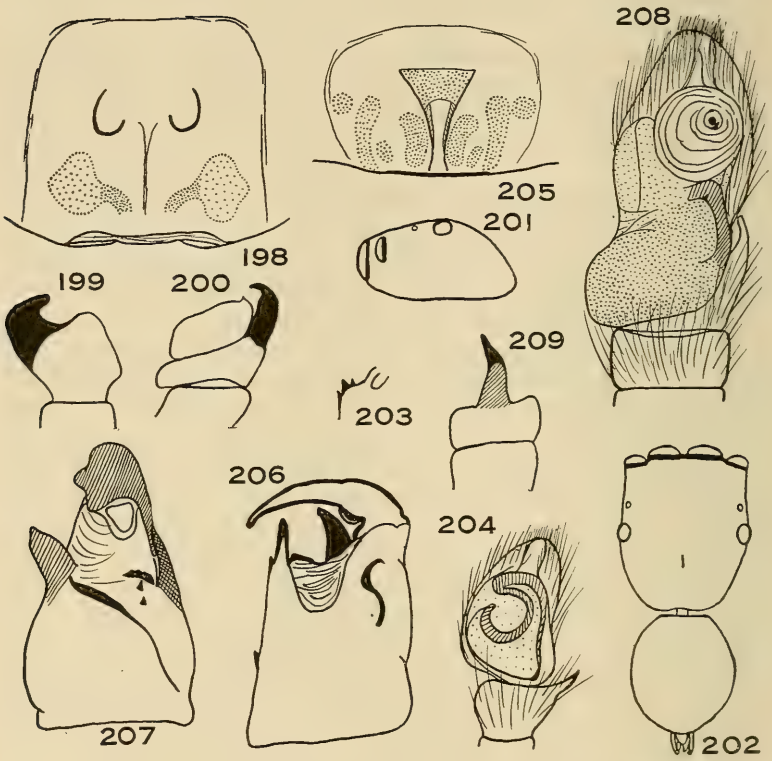
Spines: First leg: femur and patella 0; tibia only ventral 2–2–2 (first pair near base, last pair not terminal); metatarsus only ventral 0–2–2 (both pairs very long). Second leg: femur and patella 0; tibia only ventral 1r–1r–0; metatarsus as in first. Third leg: only meta-

tarsus retrolateral 0–1. Fourth leg: only metatarsus prolateral and retrolateral 0–2. No palpal spines observed.

Palp. Femur nearly straight, moderately enlarged; both patella and tibia short but latter about two thirds as long as former; tibial retrolateral apophysis a fairly stout spur, extending nearly at right angle to long axis of tibia; embolus arises at base of bulb, curves around prolateral side and extends to distal end as a slender filament (Fig. 204).

Abdomen. Length .83 mm. Longer than wide in ratio of 25 : 18; exclusive of anal tubercle, broad oval in outline; anal tubercle hidden by prominent tuft of white lanceolate hairs which make a spot like the four abdominal spots; six spinnerets fairly prominent for so small a spider, anterior pair somewhat the stoutest and not quite approximated at their bases, posterior pair slenderer and somewhat the longest; position of colulus indicated by a fairly conspicuous tuft of black hair; tracheal spiracle somewhat obscure but near base of spinnerets, without tubercle.

Color in alcohol. Carapace; generally brown with eyes on black spots and whole interocular area dark brown, somewhat lighter between PLE; lateral sides and steep posterior declivity with dark brown streaks; a narrow black marginal stripe and just dorsal to it is a narrow light stripe; clypeus and area beneath ALE as already noted. Palps dark brown. Chelicerae and maxillae light amber. Sternum and lip light amber with dark brown streaks. Legs: first pair yellowish with a black prolateral stripe from near base of femora to distal end of metatarsi, on patellae and tibiae this stripe also involves much of the ventral surface, and another stripe on retrolateral side of femora nearly connected across ventral surface with the prolateral stripe near base; second pair like first except prolateral stripe is much narrower and on femora is broken into spots, retrolateral femoral stripe only represented by a small distal spot; third and fourth legs yellowish with dark brown bands on all segments between trochanters and tarsi. Abdomen: amber dorsally with a brownish base which extends laterally and across the posterior end just anterior to anal tubercle as an indefinite bar, another similar bar passes across dorsum about the middle to connect the two lateral brownish stripes; about one fourth from base is a pair of small white spots on dorsolateral margins, and another pair of small white spots lie just behind the middle, these four small spots made by tufts of white lanceolate hairs and the white anal tuft make a distinctive pattern; laterally brownish with very narrow longitudinal yellowish lines; venter yellowish behind genital groove and brownish over lung areas.



External Anatomy of Spiders

Fig. 198. *Phiale pallida*, epigynum, ventral view.
Figs. 199–200. *P. panamae*, tibial apophysis, dorsal and retrolateral views.
Figs. 201–202. *Jollas minutus* Chickering; carapace, lateral view; body, dorsal view.
Fig. 203. *J. minutus* Chickering; male cheliceral teeth.
Fig. 204. *J. minutus* Chickering; male palp, ventral view.
Fig. 205. *J. minutus* Chickering; epigynum, ventral view.
Figs. 206–207. *Ashtabula dentata* ,chelicera, front view and medial view.
Figs. 208–209. *A dentata*, male palp, ventral view; palpal tibia, retrolateral view.

Female allotype. Total length 2.37 mm. Carapace 1.10 mm. long, .84 mm. wide at PLE which occupy almost the full width of the carapace, .64 mm. tall and, therefore, .76 as tall as wide; general form essentially as in male, though less bold in outline; no definite median thoracic groove observed.

Eyes. Anterior row recurved essentially as in male. Posterior row slightly wider than anterior row, wider than middle row in ratio of 39 : 34. Quadrangle of laterals wider than long in ratio of 39 : 26. Total eye space occupies three fifths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 12.5 : 7 : 2 : 7. AME contiguous to one another and barely separated from ALE. Middle eyes closer to PLE than to ALE in ratio of 5 : 8. Height of clypeus equal to one sixth of the diameter of AME. Clypeus not receding as in male, decorated only with a single long brownish bristle beneath outer border of AME, and three long upturned bristles in lower angle between AME.

Chelicerae. Basal segment .35 mm. long. Promargin of fang groove with four teeth; definitely no retromarginal teeth or ridge.

Maxillae. Essentially as in male.

Lip. Wider than long in ratio of 10 : 7. Reaches only to middle of maxillae. Otherwise as in male.

Sternum. Essentially as in male.

Legs. 4132. Tibial index of first leg 14, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.62	.34	.42	.33	.27	1.98
2.	.55	.30	.30	.32	.24	1.71
3.	.65	.27	.33	.37	.27	1.89
4.	.75	.33	.57	.50	.32	2.47

Otherwise as in male. Palp with prolateral fringe well developed on tarsus but weak on tibia.

Spines. First leg as in male. Second leg: femur and patella 0; tibia prolateral 0–1–0, ventral 1r–2–0; metatarsus as in first. Third leg: only metatarsus prolateral 0–1. Fourth leg: only tibia prolateral and retrolateral 0–0–1–0; metatarsus as in male. Apparently no palpal spines.

Abdomen. Length 1.40; longer than wide in ratio of 22 : 15. Otherwise as in male.

Epigynum. Simple; no posterior marginal notch; a simple vase-like figure through center longitudinally (Fig. 205).

Color in alcohol. Carapace: in general much as in male; interocular

area much lighter than in male; just dorsal to ventral marginal black stripe is a definite white stripe made by white lanceolate hairs. Palps yellowish; other mouth parts similar to those of male, but lighter. Legs: similar to those of male but lighter; on first legs the prolateral stripes are narrower, weak on femora; femoral retrolateral stripe almost lacking; bands on other legs barely visible. Abdomen: brownish dorsally with many yellowish white streaks and poorly defined chevrons in posterior half; the four small dorsal white spots are less conspicuous than in male; many clear iridescent scales over dorsal and lateral surfaces; venter light brownish, bordered with a row of yellowish dots on each side and bearing near center a pair of rows of these same dots less distinct.

Type locality. Male holotype and female allotype from Canal Zone Biological Area, July, 1934. Three male paratypes from the Canal Zone Forest Reserve, C. Z., Aug., 1939.

Jollas peritas Banks, 1929

The original description was based on a female from the Canal Zone Biological Area, July or Aug. I have two females from the same locality, June–July, 1934, and one female from El Valle, R. P., July, 1936. The relationships of this spider are very obscure. For a more complete understanding of the species we must await the discovery of the male and a careful study of both sexes.

Metaphidippus Group

Key to the genera of the Metaphidippus Group

1. Retromargin of fang groove with a single fissidentate tooth (*Beata, Cheliferoides, Donaldius* gen. nov., females of *Parahentzia*) 9
1. Retromargin of fang groove with a single simple tooth (*Ashtabula, Atelurius, Avitus, Habronattus, Metaphidippus*, males of *Parahentzia, Paraphidippus, Parnaenus*) 2
2. PME about midway between ALE and PLE; PLE occupy nearly full width of carapace; carapace low and flat; first femora, patellae, and tibiae much enlarged; first tibiae especially with a heavy ventral fringe of clavate hairs; first tibiae only with ventral spines ..... *Ashtabula*, (p. 248)
2. Not with combination of characters given above 3
3. PME about midway between ALE and PLE; PLE occupy nearly full width of carapace; carapace moderately high, well rounded; first pair of

legs not notably enlarged in any segment, without ventral fringes; posterior thoracic declivity abrupt and somewhat concave. *Atelurius*, (p. 253)

3. Not with combination of characters given above....4
4. (Data taken from genotype) PME closer to ALE than to PLE in ratio of about 1 : 2; PLE occupies about three fourths of width of carapace; carapace moderately high, declines gradually for half its length behind PLE to posterior declivity; chelicerae strongly produced; first pair of legs elongated but not notably enlarged; first ventral tibial spines occupy about half the length of segment.... *Avitus*, (p. 257)
4. Not with combination of characters given above....5
5. PME about midway between ALE and PLE; PLE occupy nearly entire width of carapace; carapace moderately high, gently arched dorsally, moderately convex laterally; first pair of legs moderately enlarged, with a ventral fringe from femur throughout metatarsus.. *Habronattus*, (p. 281)
5. Not with combination of characters given above....6
6. PME considerably closer to ALE than to PLE; PLE occupy about four fifths of width of carapace; carapace moderately low, quite convex along lateral sides, rather flat dorsally; first pair of legs considerably enlarged, with a short ventral fringe on femur and patella.... *males of Parahentzia*, (p. 316)
6. Not with combination of characters given above....7
7. PME considerably closer to ALE than to PLE; PLE occupy about four fifths of width of carapace; carapace moderately high, moderately arched dorsally, with a distinct lateral dilation between ALE and PLE; first pair of legs not notably enlarged, with or without a ventral fringe; chelicerae robust, more or less produced in male..... *Parnaenus*, (p. 334)
7. Not with combination of characters given above....8
8. PME usually closer to ALE than to PLE, sometimes about midway between them; PLE occupy about five sixths of width of carapace; carapace moderately high, moderately arched dorsally, moderately convex laterally; first pair of legs not notably enlarged, without ventral fringes; chelicerae moderately robust, not notably produced in male; usually small species.... *Metaphidippus*, (p. 285)
8. PME considerably closer to ALE than to PLE; PLE occupy about two thirds of full width of carapace; carapace moderately high, robust, well rounded dorsally and laterally; first pair of legs not notably enlarged, with a ventral fringe; chelicerae robust, usually greatly produced in male; usually much larger species.... *Paraphidippus*, (p. 322)
9. PME somewhat closer to ALE than to PLE; PLE occupy about seven eighths of width of carapace; carapace rather high and robust; first leg usually somewhat enlarged, without ventral fringes..... *Beata*, (p. 257)
9. Not with combination of characters given above....10
10. PME somewhat closer to PLE than to ALE; PLE occupy about six sevenths of width of carapace; carapace low and flat; first leg greatly enlarged; first tibia chelate with metatarsus, with a ventral fringe of simple hair.... *Cheliferoides*, (p. 275)

10. Not with combination of characters given above.....11
11. (Only females available) PME slightly closer to ALE than to PLE; PLE occupy full width of carapace; carapace moderately high, quite flat dorsally; first leg moderately enlarged, with no ventral fringes.....
Donaldius, (p. 278)
11. PME considerably closer to ALE than to PLE; PLE occupy about seven eighths of width of carapace; carapace moderately low, rather flat dorsally; first leg much enlarged, with a poorly developed ventral fringe.....
females of Parahentzia, (p. 316)

Genus Ashtabula Peckham, 1894

Ashtabula dentata F. Cambridge, 1901

Figures 206–211

F. Cambridge ('01) very briefly described the male holotype of this species, and gave good figures of the palpus and several other structures. So far as I know, the species has not been reported since Cambridge's time. I consider the more complete understanding of the species of sufficient importance to warrant a detailed study of both sexes which I give herewith. It is unfortunate that the genotype, *A. zonura* Peckham, is not now available for study. Recently while examining Emerton's figure and Peckham's description of that species I have had my suspicions aroused concerning the possibly synonymy of *A. dentata* F. Cambridge with A. *zonura* Peckham.

Male hypotype. Total length 3.52 mm. Carapace considerably overlapped by abdomen; lateral sides of cephalic part nearly parallel; lateral sides in thoracic part converge considerably; posterior border only five elevenths as wide as width of carapace at level of PLE. Carapace 1.73 mm. long, 1.22 mm. wide at level of third row of eyes which occupy about ten elevenths of width of carapace at that level; longitudinal thoracic groove almost lacking; low and flat dorsally to steep posterior declivity which begins nearly half way from third row of eyes to posterior border; about two thirds as high as wide.

Eyes. Seen from in front, anterior row strongly recurved. Anterior row as wide as posterior row, eyes of second row one fifth narrower. Quadrangle of lateral eyes wider than long in ratio of 10 : 7. Total eye space occupies a little less than one half the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 16 : 8 : 2 : 6.5. AME separated from one another by a little less than one sixteenth of their diameter, from ALE by about the same distance. Eyes of second row slightly closer to PLE than to ALE. Height of clypeus equal to about

one thirty-second of diameter of AME. A few long straight and a few long curled bristles in vicinity of anterior eyes but none which seems to be particularly distinctive.

Chelicerae. Strongly chitinized; essentially parallel and vertical; moderately produced; with outer margins wavy and somewhat grooved; margins of fang groove considerably excavated; fang enlarged in its proximal two fifths and with a short blunt prolateral tooth at beginning of enlargement. Basal segment with a very large prolateral tooth extending forward and medially; this has been called a tooth of the fang groove but it is not such. The much modified fang groove has two very small promarginal teeth and one large retromarginal tooth. All teeth of the fang groove stand upon a strong basal enlargement (Figs. 206–207).

Maxillae. Longer than wide in middle in ratio of 2 : 1; strongly concave along outer border; dilated apically; with a well developed scopula along truncature and the usual serrula along submargin from scopula to outer distal angle.

Lip. Greatest width at base where it is slightly wider than long; basal excavations reach just short of middle of organ; reaches to about middle of maxillae; distal border mildly concave. Sternal suture very slightly procurved.

Sternum. Longer than wide in ratio of 8 : 5; widest opposite second coxae; moderately convex; not extended to a point between fourth coxae which are separated by one fifth of their diameter.

Legs. 1423. Tibial index of first leg 15, of fourth leg 16.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.17	.64	1.09	.89	.51	4.30
2.	.77	.40	.56	.51	.33	2.57
3.	.75	.38	.52	.52	.38	2.55
4.	.89	.45	.68	.64	.35	3.01
Palp	.56	.15	.09	—	.60	1.40

First leg very stout and much elongated, with all segments except metatarsus and tarsus much enlarged. First coxa nearly twice as long as second coxa. First femur and tibia laterally compressed as well as enlarged. First leg with a ventral fringe as follows: femur with small fringe along retromargin in distal half; patella with a heavy fringe in distal three fifths; tibia with a heavy fringe throughout segment; hairs in fringe simple.

Spines. First leg: femur dorsal three weak spines in distal half with none terminal, prolateral one weak distal; patella 0; tibia only ventral

0–2–2–2, all in distal seven tenths of segment; metatarsus only ventral 0–2–2. Second leg: femur as in first with spines somewhat heavier; patella 0; tibia only ventral 1r–0–2; metatarsus only prolateral 0–1, ventral 1r–1r. Third leg: femur dorsal as in first and second, prolateral and retrolateral distal 1; patella 0; tibia only ventral 0–0–1r; metatarsus only prolateral 0–0–2, retrolateral 0–0–1. Fourth leg: femur dorsal 1–1–1, retrolateral only distal 1; patella 0; tibia only ventral 0–0–1r; metatarsus only prolateral and retrolateral 0–0–1. No palpal spines observed.

Palp. Both patella and tibia short; tibial apophysis fairly stout in proximal two thirds, somewhat geniculate and very pointed in distal third; embolus obscure, originates near middle on retrolateral side and curves inward to terminate dorsal and anterior to a circular rugulose area (Figs. 208–209).

Abdomen. Rather slender, longer than wide at base in ratio of 35 : 13; with a mildly developed dorsal shield extending nearly whole length of dorsum; with a small tuft of erect white hairs at each basal corner; a fairly prominent cone-shaped anal tubercle; anterior pair of spinnerets most robust and single-jointed as well as intermediate in length, posterior pair somewhat longer and plainly two-jointed, middle pair shortest and slenderest; colulus apparently a very minute cone; tracheal spiracle near base of spinnerets.

Color in alcohol. Legs: first pair a deep reddish brown except tarsi and distal ends of metatarsi which are yellowish; other three pairs of legs yellowish with a few reddish brown annulations and stripes. Palp a deep reddish brown; maxillae the same except the yellowish tips. Chelicerae a deep amber. Carapace: generally a rich reddish brown; with a narrow white stripe below each PLE extending to posterolateral corner and forward to anterior row of eyes which are largely surrounded by the white scales of which it is composed; also a very narrow white stripe just above margin; scattered white scales along lateral sides. Sternum dark brown. Abdomen: white base extends narrowly along dorsolateral sides thus delimiting dorsal shield as an amber colored region within which a dark central serrated stripe occurs, more or less connected with a series of six pairs of dark spots resembling the original figure of *A. zonura* Peckham; laterally streaked with alternate narrow yellowish and brownish broken stripes; ventrally with a broad central dark brown stripe; many small iridescent scales everywhere except on venter.

Female allotype. Total length 3.71 mm. Carapace 1.47 mm. long, 1.09 mm. wide at level of PLE, about half as tall as wide.

Eyes. Total eye space occupies a little more than one half the length of the carapace. Other features essentially as in male.

Chelicerae. Vertical, parallel; of moderate size; without special modifications. Fang groove with two small promarginal teeth; a single fairly stout retromarginal tooth (Fig. 210).

Maxillae. Essentially as in male, but less strongly developed.

Lip and *Sternum.* Essentially as in male.

Legs. 4123. Tibial index of first leg 24, of fourth leg 16.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.78	.45	.57	.46	.31	2.57
2.	.62	.34	.45	.37	.28	2.06
3.	.55	.30	.43	.42	.31	2.01
4.	.75	.45	.63	.51	.34	2.68

First leg enlarged slightly less than in male, fringe essentially as in male.

Spines. Essentially as in male.

Abdomen. Essentially as in male except erect hairs extend across basal end, and dorsal shield is less distinct.

Epigynum. Simple and somewhat obscure; with a deep central posterior marginal notch in front of which are coiled tubules showing from within; near anterior margin lies a pair of rather small openings nearly twice the diameter of one of them apart (Fig. 211).

Color in alcohol. Almost identical to that of male except as noted.

Type locality: Male hypotype and female allotype from El Valle, R. P., July, 1936; other males from El Valle, R. P., July, 1936 and Madden Dam region, C. Z., Aug., 1939; other females from Canal Zone Biological Area, July, 1939, El Valle, R. P., July, 1936, and Madden Dam region, C. Z., Aug., 1939.

ASHTABULA MONTANA spec. nov.

Figures 212–213

Female holotype. Total length 2.88 mm. Carapace 1.41 mm. long, .83 mm. wide slightly behind PLE which occupy the full width of the carapace at their level, .52 mm. tall and, therefore, about .63 as tall as wide; with lateral sides nearly vertical and gently rounded anteroposteriorly; surface finely granulate and somewhat rugulose; with a very short median longitudinal thoracic groove just in front of the

beginning of the steep posterior declivity which begins nearly two thirds of the distance from PLE to posterior border.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one eighth of the diameter of ALE. Posterior row wider than anterior row in ratio of 37 : 31, wider than middle row in ratio of 37 : 30. Quadrangle of laterals wider than long in ratio of 37 : 24. Total eye space occupies twenty-seven sixty-fourths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 10.5 : 5.5 : 1.5 : 5. AME separated from one another by one twelfth of their diameter, from ALE by one tenth of their diameter. Middle eyes slightly closer to ALE than to PLE. Height of clypeus equal to one tenth of the diameter of AME. Clypeus decorated by a fringe of slender bristles, three long upturned bristles in lower angle between AME. A few white lanceolate hairs surround AME, a few others are scattered below ALE.

Chelicerae. Fairly robust, vertical, parallel; swollen in front near base; quite widely separated and slightly excavated medially. Fang fairly robust, evenly curved. Fang groove with two small promarginal teeth at inner end of groove; a single fairly robust retromarginal tooth nearly in middle.

Maxillae. Parallel, somewhat dilate distally; longer than wide in middle in ratio of about 3 : 2; only mildly concave in middle of outer border; distal border rounded to include outer distal corner which is without tubercle or hook.

Lip. About as wide as long; basal excavations reach about two fifths of length of organ; reaches about to middle of maxillae. Sternal suture straight.

Sternum. Quite elongate; longer than wide in ratio of 2 : 1; mildly convex; widest between second coxae but nearly as wide between third; anterior border much narrower than base of lip; posterior end blunt and not extended between fourth coxae which are separated by one half their width; anterior coxae stoutest and separated by less than width of anterior border. No trochanters unusually elongated.

Legs. 4132. Tibial index of first leg 28, of fourth leg 10.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.57	.38	.38	.28	.20	1.81
2.	.51	.26	.29	.26	.19	1.51
3.	.50	.25	.32	.30	.22	1.59
4.	.65	.30	.57	.41	.26	2.19

First leg much enlarged, especially the femur, patella, and tibia; tibia with a well developed ventral black fringe (Fig. 212).

Spines. First leg: femur only dorsal 0–1(long, slender)–1–1(both the latter, small and short)–0; patella 0; tibia only ventral 2–2–2 (fairly well matched and occupying the distal two thirds of segment;) metatarsus only ventral 0–2–2. Second leg: femur only dorsal 0–1–1–1–0 (size as in first); patella 0; tibia only ventral 0–1r–1r; metatarsus prolateral 0–1, ventral 1r–1r. Third leg: femur and patella as in second; tibia 0; metatarsus only prolateral and retrolateral 0–1. Fourth leg: femur and patella as in second; tibia and metatarsus 0. Palpal spines 0.

Abdomen. Ovoid; longer than wide in ratio of about 2 : 1; widest about the middle; spinnerets of moderate length and size; tracheal spiracle near base of spinnerets, with distinct lip but with no tubercle; position of colulus indicated by a tuft of black hairs.

Epigynum. Simple, small; epigynal plate somewhat longer than wide; posterior margin with a shallow notch; near center of plate are two small, obliquely placed slits (Fig. 213).

Color in alcohol. Carapace; generally brown, darker in interocular area, eyes on black spots; a few white lanceolate hairs scattered over surface and concentrated along posterolateral margins. Chelicerae light yellowish brown; maxillae and lip the same with whitish tips. Sternum brownish. Legs: first pair light reddish brown except yellowish white tarsi and metatarsi, white lanceolate hairs on prolateral and dorsal surfaces of distal ends of femora, patellae, and tibiae; all coxae and trochanters yellowish white and becoming progressively whiter toward the fourth; second pair of legs yellowish white with prolateral brown stripes on femora, patellae, and tibiae, and retrolateral brown stripe on femora; third and fourth much like second; all from second to fourth with many white lanceolate hairs on dorsal surfaces. Abdomen: generally dull brown; at end of first third a pair of white dorsolateral bars do not quite meet dorsally; lateral sides dull brown; venter a lighter brown; whole abdomen with many clear iridescent scales; spinnerets yellowish.

Type locality. Female holotype from El Valle, R. P., July, 1936. No paratypes.

Genus Atelurius Simon, 1901

Atelurius incertus Banks, 1929

Figures 214–218

Mr. Banks ('29) had a single female from the Canal Zone Biological Area, July, 1924. Simon established the genus on the basis of a species

from Venezuela, and thus far only two species have been referred to it. I am unacquainted with the genus and, from Simon's brief treatment of it, I am unable to come to any decision as to the correct placement of this species. The Peckhams had a species in their collection which they labelled Akela, new. This appears to be very close to *A. incertus* Banks. The Peckhams established the genus Akela on the species *A. charlottae* from Guatemala. I think the species under consideration here is not an Akela. I know nothing better to do with it for the present than to retain it here pending further knowledge.

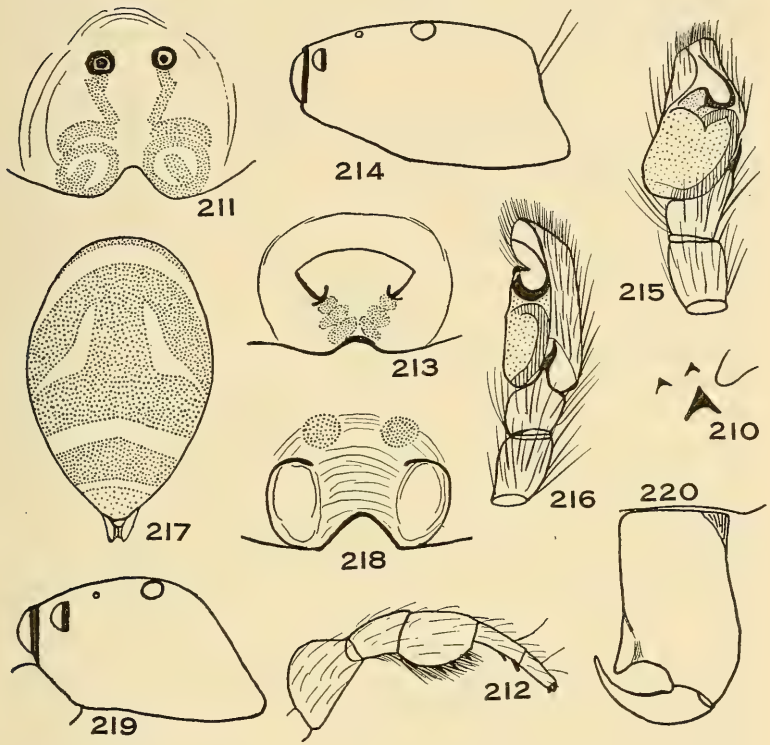
Male allotype. Total length 3.20 mm. Carapace 1.50 mm. long, 1.20 mm. wide at level of PLE which occupy forty-eight fifty-thirds of the width of the carapace at their level; very little narrowed in front; fairly high; shaped much as in Zygoballus; slightly more than three quarters as high as wide; gently arched dorsally for nearly six sevenths of length to posterior declivity which is slightly concave and descends abruptly to posterior border (Fig. 214).

Eyes. Seen from in front, anterior row strongly recurved. Posterior row wider than anterior row in ratio of 49 : 45, middle row slightly narrower than anterior row. Quadrangle of laterals wider than long in ratio of 49 : 29. Total eye space occupies almost half the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 14 : 7 : 1.75 : 6. AME separated from one another by a little less than one fourteenth of their diameter, from ALE by nearly one seventh of their diameter. Eyes of second row equidistant from ALE and PLE. Height of clypeus equal to a little less than three fourteenths of the diameter of AME. A fairly conspicuous small tuft of white scale-like hairs projecting downward from beneath each AME.

Chelicerae. Robust, quite porrect, considerably produced; divergent beyond the basal third; with well developed basal boss; basal segment .80 mm. long; most of front surface covered by long white procumbent hairs, somewhat erect along dorsal edge. Fang fairly long and slender, slightly sinuous. Fang groove distinct, with a single robust retromarginal tooth near base of fang, and two promarginal teeth, one near base of fang and the other near medial end of groove.

Maxillae. Parallel; considerably dilated distally; quite concave along outer border; palp inserted into proximal half; longer than wide in middle in ratio of about 2 : 1; with well developed scopula along truncature and the usual serrula.

Lip. Widest at base where it is as wide as long; distal margin regularly convex; basal excavations reach less than one third of length of organ; sternal suture slightly procurved.



External Anatomy of Spiders

Fig. 210. *Ashtabula dentata*, female cheliceral teeth.
Fig. 211. *A. dentata*, epigynum, ventral view.
Fig. 212. *A. montana* Chickering; first leg.
Fig. 213. *A. montana* Chickering; epigynum, ventral view.
Fig. 214. *Atelurius incertus*, carapace, lateral view.
Figs. 215–216. *A. incertus*, male palp, ventral view; and retrolateral view.
Fig. 217. *A. incertus*, male abdomen, dorsal view.
Fig. 218. *A. incertus*, epigynum, ventral view.
Fig. 219. *Beata levispina*, carapace, lateral view.
Fig. 220. *B. levispina*, chelicera, front view.

Sternum. Longer than wide in ratio of 3 : 2; scutiform; widest between second coxae, but nearly as wide between first; quite convex; terminates posteriorly in a blunt point which is not extended between fourth coxae which are separated by three tenths of their diameter.

Legs. 1423. Tibial index of first and fourth legs 17.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.96	.50	.70	.56	.38	3.10
2.	.77	.42	.48	.44	.33	2.44
3.	.77	.37	.48	.42	.36	2.40
4.	.97	.42	.63	.51	.38	2.91
Palp	.60	.22	.13	—	.42	1.37

Legs without fringes. First leg considerably extended and first femora somewhat enlarged but not greatly so.

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral distal 2; patella only prolateral 0–1–0; tibia only prolateral 0–1–0, ventral 1r–1r–2 on right, 1r–2–2 on left; metatarsus only ventral 2–2. Second leg: as in first except metatarsus ventral 1r–2. Third leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 1; patella only retrolateral 0–1–0; tibia only prolateral 0–1–0; retrolateral 0–2–0, ventral 0–0–2; metatarsus prolateral 0–0–2, retrolateral 0–0–1, ventral 0–0–2. Fourth leg: femur and patella as in third; tibia prolateral 0–1–0, retrolateral 0–1–0, ventral 0–0–2; metatarsus as in third.

Palp. Both tibia and patella short with former only a little more than half as long as latter; femur much bent; tibial retrolateral apophysis long, slender, and sinuous; embolus sickle-shaped from an expanded base (Figs. 215–216). At distal end of femur is a dorsal snow white cap of scales which may extend over a much longer part of the segment in life.

Abdomen. Ovoid, longer than wide in ratio of 13 : 8; widest near middle; all spinnerets short, first pair most robust, third pair somewhat slender and plainly two-jointed, middle pair shortest and closely surrounded by others; tracheal spiracle near base of spinnerets; apparently colulus indicated by a very small tuft of black bristles.

Color in alcohol. Legs: first and second pairs of coxae dull brownish, others lighter; all femora dark brown with scattered white scales, first pair with a rather conspicuous prolateral white patch of scales; all patellae yellowish tipped with reddish brown; all tibiae reddish brown; first metatarsi yellowish in proximal third, elsewhere reddish brown, second and third metatarsi yellowish except reddish brown distal ends,

fourth metatarsi entirely reddish brown; first three pairs of tarsi yellowish, fourth pair reddish brown with yellowish tips. Carapace: rich reddish brown, almost black around eyes; a broken white stripe extends on each side from ALE to posterolateral corner and down to posterior border; a few white scales along ventral margin; central part of clypeus between AME without white scales which extend as a tuft beneath AME and over front surface of chelicerae and, less conspicuously, laterally along cheek region. Abdomen: dark reddish brown at base; then a series of light and dark bars on dorsum best shown in Figure 217; thus nine distinct dorsolateral bars; venter dull brown.

Female. Characters briefly summarized by Banks ('29). Epigynum with a deep central posterior marginal notch and a median swelling separating two shallow cavities (Fig. 218).

Type locality. Male allotype from Canal Zone Biological Area, June, 1939. Male paratypes and females from the following localities: El Valle, R. P., July, 1936; Canal Zone Forest Reserve, C. Z., July–Aug., 1939; Canal Zone Biological Area, June, Aug., 1939.

Genus Avitus Peckham, 1896

Avitus diolenii Peckham, 1896

Avitus diolenii F. Cambridge, 1901
A. diolenii Simon, 1901
A. diolenii Petrunkevitch, 1911
A. diolenii Petrunkevitch, 1925

The Peckhams had a single male from Panama sent to them by Count Keyserling. So far as I know, the species has not been collected since that time. It has not yet appeared in my collection. I have a single male from the Canal Zone Biological Area, Aug., 1939, which I have tentatively assigned to this genus. It is a damaged specimen and will not be described in this paper. When better specimens are available it will certainly have to be described as a new species and possibly will be the basis of a new genus.

Genus Beata Peckham, 1895

Professor Petrunkevitch ('25) considered that six species of the genus Beata were known at the time of his paper on Arachnida from Panama. He gave a detailed description of the female of *B. magna*

Peckham and also described *B. striata* as a new species. I have retained *B. variegata* (F. Cambridge) in the genus with some hesitation. It is probably a species whose single retromarginal tooth is intermediate between the fissidentate and unidentate condition. It shows in some females as a fissidentate tooth but in males which I have examined it is quite distinctly unidentate. *M. levispinus* F. Cambridge is transferred to this genus on the basis of several characters as well as the fissidentate retromarginal tooth on the fang groove. Mr. Banks ('29) identified two males as *Homalattoides roseus* F. Cambridge and a female as *Beata magna* Peckham. I think both of these are *Dryphias maccuni* (Peckham) and I have so treated them in this paper. With the changes which I have indicated and including additions from my collections we appear to have ten species of Beata now known from Panama; *B. cephalica* F. Cambridge; *B. flavolineata* (F. Cambridge); *B. levispina* (F. Cambridge); *B. longipes* (F. Cambridge); *B. magna* Peckham; *B. munda* sp. nov.; *B. striata* Petrunkevitch; *B. variegata* (F. Cambridge); *B. venusta* sp. nov.; *B. zeteki* sp. nov. Both sexes are known for only two of these.

Key to the species of Beata from Panama

Males

1. Carapace with two dorsolateral yellowish stripes; abdomen with a central dorsal and two dorsolateral yellowish stripes. Palp: tibial apophysis a simple hooked spur; embolus distal in origin, slender, sinuous..... *B. flavolineata*, (p. 260)
1. Not with combination of characters given above.....2
2. Carapace without conspicuous stripes; basal half of chelicerae with many white hairs; abdomen with an obscure central dorsal light stripe with a series of obscure dark spots on each side of it. Palp: tibial apophysis a fairly stout, nearly straight spur; embolus originates on prolateral side and completes more than a full turn of a spiral..... *B. levispina*, (p. 260)
2. Not with combination of characters given above.....3
3. Carapace with scattered white scales but without stripes; abdomen with light brownish dorsum and numerous white scales; an oval scutum in anterior half of dorsum. Palp: tibial apophysis a sharply pointed spur, strongly geniculate near its base; embolus distal in origin, stout and squarely truncate distally..... *B. longipes*, (p. 264)
3. Not with combination of characters given above.....4
4. Carapace with a pair of white dorsolateral stripes; chelicerae without white hairs; abdomen with a pair of yellowish white dorsolateral stripes. Palp: tibial apophysis a stout hooked spur; embolus distal in origin, stout, straight, pointed at tip..... *B. variegata*, (p. 267)

4. Carapace with inconspicuous white dorsolateral stripes; chelicerae without white hairs; abdomen with a pair of narrow whitish dorsolateral stripes bounding central dorsal reddish brown area. Palp: tibial apophysis a short, stout, distally blunt spur; embolus distal in origin, nearly straight, gradually narrowed from base to tip..... *B. venusta*, (p. 271)

Females

1. PLE occupy full width of carapace, on low but distinct tubercles. Epigynum without posterior marginal notch; with a lip a short distance in front of posterior margin; center of plate with two small depressions more than three diameters of one of them apart..... *B. cephalica*, (p. 260)
1. Not with combination of characters given above.....2
2. PLE occupy about seven ninths of width of carapace, not on distinct tubercles. Epigynum: with a deep posterior marginal notch; anterior half of plate occupied by two oval depressions separated by a low septum..... *B. levispina*, (p. 260)
2. Not with combination of characters given above.....3
3. PLE occupy about seven eighths of width of carapace, not on distinct tubercles. Epigynum: with a moderately deep posterior marginal notch; anterior half of plate with a median transverse depression and a pair of conspicuous tubules procurved from middle of plate..... *B. magna*, (p. 264)
3. Not with combination of characters given above.....4
4. PLE occupy about eleven twelfths of width of carapace, not on low tubercles; clypeus with many white hairs. Epigynum: with a shallow posterior marginal notch; central part with a pair of procurved plates bounding a slightly depressed area..... *B. munda*, (p. 265)
4. Not with combination of characters given above.....5
5. PLE occupy about five sixths of width of carapace, not on low tubercles; clypeus and base of chelicerae with many whitish hairs. Epigynum: with a broad but shallow posterior marginal notch; anterior half of plate without a central depressed area, but with a pair of procurved plates bounding a central, somewhat swollen area..... *B. variegata*, (p. 267)
5. Not with combination of characters given above.....6
6. PLE occupy about ten elevenths of width of carapace, not on distinct tubercles; clypeus with many white hairs. Epigynum: with a moderately deep posterior marginal notch; anterior half of plate with a pair of small depressions, nearly contiguous..... *B. striata*, (p. 267)
6. PLE occupy nearly five sixths of width of carapace, not on distinct tubercles; clypeus with many white hairs overhanging bases of chelicerae. Epigynum: with a posterior marginal notch and a recess which extends laterally on both sides; posterior half of plate with a pair of deep depressions separated by a septum wider than the long diameter of one of the depressions *B. zeteki*, (p. 273)

Beata cephalica F. Cambridge, 1901

B. cephalica Petrunkevitch, 1911
B. cephalica Petrunkevitch, 1925

F. Cambridge had only the female to this species and, so far as I know, it has not been reported since that time. It has not yet appeared in my collections.

Beata flavolineata (F. Cambridge), 1901

Metaphidippus flavolineatus F. Cambridge, 1901
B. flavolineata Simon, 1903
B. flavolineata Petrunkevitch, 1911
B. flavolineata Petrunkevitch, 1925

In the Nathan Banks collection in the Museum of Comparative Zoölogy are specimens of this species from Vera Cruz, Mexico. In the Peckham collection are many specimens from San Rafael, Mexico?, but this lot may be mixed. I have several specimens from Boquete, R. P., July, 1939. Only males are known.

Beata levispina (F. Cambridge), 1901

Figures 219–224

Metaphidippus levispinus F. Cambridge, 1901
Dendryphantes levispinus Petrunkevitch, 1911
D. levispinus Petrunkevitch, 1925

F. Cambridge apparently paid little attention to teeth along the fang groove. He described this species as having but one tooth on the promargin of the fang groove and two on the retromargin. A careful study shows that the smaller of the two regarded as retromarginal teeth is in reality the expected small promarginal tooth. The retromarginal tooth is definitely fissidentate. This and other features lead me to believe the species to be a Beata and so I transfer it to that genus.

Male hypotype. Total length 4.54 mm. Carapace 2.27 mm. long, 1.79 mm. wide at level of PLE which occupy slightly more than seven eighths of the width of the carapace at their level; 1.21 mm. tall and, therefore, nearly .69 as tall as wide; dorsal surface, especially the interocular area, finely granulate; rather robust in general with lateral sides well rounded from ALE to posterolateral corners; a very short, broad, median, longitudinal, thoracic groove in a shallow depression about half way from PLE to beginning of steep posterior declivity which begins about half way from PLE to posterior border (Fig. 219).

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one tenth of the diameter of ALE. Posterior row wider than anterior row in ratio of 25 : 23, wider than middle row in ratio of 5 : 4. Quadrangle of laterals wider than long in ratio of 5 : 3. Total eye space occupies nine seventeenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 19 : 10 : 2.3 : 9. AME separated from one another by two nineteenths of their diameter, from ALE by one fourth of their diameter. Middle eyes closer to ALE than to PLE in ratio of 13 : 16. Height of clypeus equal to one fourth of the diameter of AME. Clypeus decorated only by a ventral fringe of bristles, a transverse row of a few longer black bristles, and the usual three long bristles in lower angle between AME.

Chelicerae. Very robust; much swollen in front; parallel; somewhat porrect; basal segment 1.02 mm. long; basal half in front covered by lanceolate white hairs. Fang moderately robust, somewhat sinuous, narrows suddenly about the middle. Fang groove with two promarginal teeth, the smaller far from the larger because of the great widening of the basal segment; retromargin with a typical fissidentate tooth (Figs. 220–221).

Maxillae. Parallel; longer than wide in ratio of 2 : 1; only slightly concave along outer border; outer distal angle well rounded; palp inserted into basal two fifths.

Lip. As wide as long; basal excavations reach less than one third of length of organ; reaches to middle of maxillae. Sternal suture gently procurved.

Sternum. Elongate scutiform; longer than wide in ratio of 19 : 11, widest between second coxae; quite convex in posterior half; covered quite thickly with stiff, elongate, light colored, lanceolate hairs; anterior border about as wide as base of lip; posterior end bluntly rounded and not extended between fourth coxae which are separated by only one tenth of their diameter.

Legs. 1423. Tibial index of first leg 14, of fourth leg 17.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.72	1.28	1.53	1.02	.65	6.20
2.	1.21	.75	.77	.76	.51	4.00
3.	1.15	.64	.64	.81	.45	3.69
4.	1.41	.65	.90	.88	.45	4.29
Palp	.89	.31	.24	—	.53	1.97

Legs with a moderate amount of long light colored hair and numerous white lanceolate hairs but no fringes.

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral distal 2; patella only prolateral 0–2–0, retrolateral 0–1–0; tibia prolateral 0–0–1–0, retrolateral 0–1–0, ventral 2–2–2 (promarginal series occupy only slightly more than distal half of segment); metatarsus only ventral 0–2–2 on left, 1–2–2 on right. Second leg: femur as in first except retrolateral distal 1; patella prolateral and retrolateral 0–1–0; tibia prolateral and retrolateral 0–1–1–0, ventral 1r–1 (median)–2; metatarsus prolateral and retrolateral 1–1, ventral 2–2. Third leg: femur and patella as in second; tibia as in second except ventral 0–0–2; metatarsus prolateral and retrolateral 1–2, ventral 0–2. Fourth leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 1; patella 0; tibia prolateral 0–1–0, retrolateral 0–1–1–0, ventral 0–2; metatarsus prolateral and retrolateral 1–2, ventral 0–2. Palpal spines: only femur dorsal 0–0–1–1.

Palp. Femur considerably curved dorsoventrally; covered dorsally with white lanceolate hair; patella and tibia both short; retrolateral tibial apophysis a simple robust spur directed forward; tarsal bulb constricted posteriorly; embolus arises on prolateral side of bulb, describes nearly three fourths of a circle and terminates in a slender filament which lies transversely across cymbium. (Figs. 222–223).

Abdomen. Ovoid, longer than wide in ratio of about 8 : 5; widest in middle; anal tubercle a short cone with a terminal tuft of white hairs; spinnerets as usual in the genus; position of colulus indicated by a group of stiff hairs; tracheal spiracle near base of spinnerets.

Color in alcohol. Carapace; generally a very bright reddish brown with eyes on black spots; much lanceolate white hair which persists along dorsolateral regions to give the effect of obscure white stripes; a patch of white hair beneath each ALE; front of chelicerae white as already noted. Mouth parts generally reddish brown. Legs: first pair all dark reddish brown except yellowish tarsi which are brown in middle; first coxae reddish brown, all others yellowish; second to fourth pairs of legs much like first except progressively lighter. Abdomen: dorsum generally reddish brown; an obscure central lighter stripe flanked on either side by a series of obscure darker spots, more or less united; grayish color at base continues dorsolaterally nearly to posterior end; lateral sides with narrow alternate yellowish and brown stripes; venter with a brownish spotted central stripe bordered on each side by a row of yellowish dots.

Female allotype. Total length 5.00 mm. Carapace 2.05 mm. long; 1.79 mm. wide at level of PLE which occupy twenty-three twenty-

eighths of width of carapace at their level; 1.21 mm. tall and, therefore, .68 as tall as wide; somewhat inflated dorsolaterally behind PLE. Other features essentially as in male.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of AME are slightly above those of ALE. Posterior row wider than anterior row in ratio of 25 : 23, wider than middle row in ratio of 5 : 4. Quadrangle of laterals wider than long in ratio of 5 : 3. Total eye space occupies nine sixteenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 18 : 10 : 2 : 9.5. AME separated from one another by one ninth of their diameter, from ALE by one sixth of their diameter. Middle eyes closer to ALE than to PLE in ratio of 5 : 7. Height of clypeus obscured by white hairs but probably about two ninths of the diameter of AME. Clypeus decorated by a thick coating of white lanceolate hair and a few long bristles which protrude through the hair.

Chelicerae. Parallel, robust; very much swollen in front; basal segment .77 mm. long; covered in front with many white lanceolate hairs and long simple light colored hair. Fang robust, of moderate length, evenly curved. Fang groove with two promarginal teeth and a typical fissidentate retromarginal tooth.

Maxillae, Lip, and *Sternum.* Essentially as in male.

Legs. 1423. Tibial index of first and fourth legs 17.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.28	.89	.96	.64	.57	4.34
2.	1.02	.57	.70	.58	.51	3.38
3.	1.02	.55	.61	.64	.40	3.22
4.	1.34	.69	.83	.76	.50	4.12

Spines. First leg: femur as in male; patella only prolateral 0–1–0; tibia only ventral 2–2–2 (promarginal series occupy the distal seven tenths of segment, the retromarginal series the distal five sixths); metatarsus only ventral 2–2. Second leg: femur and patella as in male; tibia only prolateral 0–1, ventral 1r–1r–2; metatarsus only prolateral 1–0–1, ventral 2–2. Third leg: femur as in second; patella prolateral and retrolateral 0–1–0; tibia prolateral 0–1, ventral 0–0–2, retrolateral 1–1; metatarsus prolateral and retrolateral 1–2, ventral 0–2. Fourth leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 1; patella only retrolateral 0–1–0; tibia only retrolateral 0–1, ventral 0–0–2; metatarsus prolateral 1–1, retrolateral 0–1, ventral 0–2. Palpal spines: only femur dorsal 0–1–1.

Abdomen. Ovoid; longer than wide in ratio of 25 : 16; widest two fifths from base. Otherwise essentially as in male.

Epigynum. Epigynal plate small, about as long as wide; with a fairly deep posterior notch; anterior half occupied by two elongated and fairly deep depressions separated by a low septum about as wide as each depression (Fig. 224).

Color in alcohol. Carapace: a bright reddish brown overlaid by many white appressed lanceolate hairs so that the appearance is quite gray. Legs: first pair somewhat darker than others but all are yellowish white, much ringed and barred with reddish brown and all are provided with many white lanceolate hairs. All mouth parts reddish brown; chelicerae with white hairs in front; maxillae and lip with yellowish white tips. Abdomen: with pattern usually followed by female Beatas, with many variations; dorsum generally dull reddish brown with three pairs of small yellowish white spots in anterior two thirds; along dorsolateral area another series of five pairs of yellowish white marks, narrow and somewhat oblique bars, the next to the last pair being longest and best defined, the last pair united dorsal to anal tubercle; lateral areas covered by alternate narrow brown and yellow striations; central part of venter with a broad brownish stripe, lighter through the center and bordered by a row of connected yellowish dots larger than usual.

Type locality. Male hypotype and female allotype from El Valle, R. P., July, 1936. Two other males and seven female paratypes from the same locality and the same date.

Beata longipes (F. Cambridge), 1901

Homalattoides longipes F. Cambridge, 1901
B. longipes Simon, 1903
B. longipes Petrunkevitch, 1911
B. longipes Petrunkevitch, 1925

F. Cambridge had only males of this species and those only from Panama. So far as I know it has not been taken since the original collections were made, and it has not yet appeared in my collections.

Beata magna Peckham, 1895

Beata magna F. Cambridge, 1901
B. magna Simon, 1903
B. magna Petrunkevitch, 1911
B. magna Petrunkevitch, 1925

The Peckhams had four females from Colombia, but only one now remains in the Peckham collection. F. Cambridge had specimens from Guatemala and Panama. Petrunkevitch ('25) gave a detailed description of the female, but the male is still unknown. The species has not yet appeared in my collections.

Beata munda spec. nov.

Figure 225

Female holotype. Total length 4.48 mm. Carapace 1.82. long, 1.31 mm. wide just behind PLE which occupy about eleven twelfths of the width of the carapace at their level, .84 mm. tall and, therefore .64 as tall as wide; with a moderate supply of white lanceolate hair and numerous black bristles the longest of which are in the close vicinity of the eyes; with a short median longitudinal thoracic groove lying just in front of beginning of steep posterior declivity which lies about half way from PLE to posterior border.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME just misses dorsal borders of ALE. Posterior row wider than anterior row in ratio of 11 : 10, wider than middle row in ratio of 55 : 47. Quadrangle of laterals wider than long in ratio of 11 : 7. Total eye space occupies fourteen twenty-sevenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 16 : 7.5 : 2 : 7. AME separated from one another by one tenth of their diameter, from ALE by one sixth of their diameter. Middle eyes closer to ALE than to PLE in ratio of 9 : 11. Height of clypeus equal to one sixth of the diameter of AME. Clypeus decorated with numerous white lanceolate hairs, a fringe of longer white lanceolate hairs, a few white bristles, and three long white bristles in lower angle between AME.

Chelicerae. Essentially parallel, vertical; quite swollen near base medially; somewhat smoothly excavated along medial border in distal half; a brown oblique mark near base; covered with loose short lanceolate white hairs; basal segment .62 mm. long. Fang fairly robust, evenly curved. Fang groove with the usual two promarginal teeth of which the medial is small, the other considerably larger; retromargin with a single robust fissidentate tooth.

Maxillae. Parallel; longer than wide in middle in ratio of about 3 : 2; only mildly notched in middle of outer border; palp inserted into basal two fifths; outer distal corner well rounded and without tubercle or hook.

Lip. Longer than wide in ratio of 15 : 13; basal excavations reach just a little less than one third of length of organ; reaches slightly beyond middle of maxillae. Sternal suture gently procurved.

Sternum. Elongate scutiform; longer than wide in ratio of 7 : 5; widest between second coxae but not much narrowed between first coxae; quite convex in posterior three fourths; anterior border a little narrower than base of lip; posterior end squarely truncate and not extended between fourth coxae which are separated by one fourth of their width.

Legs. 4132. Tibial index of first leg 22, of fourth leg 16.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.90	.57	.56	.45	.35	2.83
2.	.78	.45	.45	.40	.32	2.40
3.	.83	.40	.40	.50	.35	2.48
4.	1.02	.51	.64	.62	.36	3.15

Legs with a moderate supply of simple hair but with no fringes.

Spines. First leg: femur dorsal 0–1–1–1, prolateral distal 2; patella 0; tibia only ventral 2–2–2 with promarginal series occupying distal two thirds of segment and retromarginal series only a little more than this; metatarsus only ventral 2–2. Second leg: femur and patella as in first except femur retrolateral distal 1; tibia only prolateral 0–1, ventral 1r–1r–2; metatarsus as in first. Third leg: femur and patella as in second; tibia prolateral and retrolateral 0–1, ventral 0–0–2; metatarsus prolateral 0–2, retrolateral 0–1, ventral 0–2. Fourth leg: femur and patella as in third; tibia prolateral 0–1, ventral 1p–0–2; metatarsus prolateral 0–1, retrolateral 0–2, ventral 0–2. Palpal spines: only femur dorsal 0–0–1.

Abdomen. Ovoid; longer than wide in ratio of 43 : 27; widest about two fifths from base; anal tubercle and spinnerets as usual in the genus; position of colulus indicated by a small tuft of dark hairs; tracheal spiracle near base of spinnerets, without tubercle.

Epigynum. Epigynal plate simple; posterior margin with a shallow notch; anterior half with two broad procurved plates enclosing a slightly depressed area (Fig. 225).

Color in alcohol. Carapace: almost entirely and fairly uniformly light reddish brown overlaid with a moderate number of white lanceolate hairs which seem to concentrate to make an indefinite marginal stripe; eyes on black spots. Sternum, chelicerae, lip, and maxillae reddish brown, the two latter tipped with yellowish white. Palps and all

legs yellowish with a few dorsal and lateral reddish brown spots, most marked on first pair of legs. Abdomen: generally yellowish white with reddish brown markings; dorsal area with a complicated pattern resembling somewhat the pattern represented by F. Cambridge for *M. variegatus* and *M. expallidatus,* difficult to describe accurately; lateral sides spotted with reddish brown, and on each side an oblique speckled reddish brown bar occurs in posterior third; venter with a broad, rectangular, central, deep reddish brown stripe from genital groove to tracheal spiracle, united laterally with oblique bar.

Type locality. Female holotype from El Valle, R. P., July, 1936. One paratype female from Boquete, R. P., July, 1939.

Beata striata Petrunkevitch, 1925

Professor Petrunkevitch had one female from Cerro Iglesia, R. P. I have had the privilege of examining the type in the collection of Professor Petrunkevitch, but the species has not yet appeared in my collection.

Beata variegata (F. Cambridge), 1901

Figures 226–227

Metaphidippus variegatus F. Cambridge, 1901
B. variegata Simon, 1903
B. variegata Petrunkevitch, 1911
B. variegata Petrunkevitch, 1925

As pointed out in an earlier place, this species has been retained in the genus Beata with some hesitation. In the males in my collection the single retromarginal tooth on the fang groove is quite distinctly unidentate. In some females the tooth is fissidentate while in others it would be called unidentate. The species appears to be one in which the teeth are in an intermediate condition between the two types. At one time in the course of the study of this family I selected a female which showed the fissidentate condition in a fairly satisfactory way and intended to describe it as a new species. I am now satisfied that the specimen belongs to this species and I, therefore, am using it as a hypotype of which I give the following description:

Female hypotype. Total length 5.12 mm. Carapace 2.50 mm. long, 1.98 mm. wide a short distance behind PLE which occupy twenty-six thirty-firsts of the width of the carapace at that level, 1.22 mm. tall and, therefore, .61 as tall as wide; only slightly depressed from PLE to posterior steep declivity which begins about six thirteenths of the dis-

tance from PLE to the posterior border; with many long black bristles throughout dorsal area, especially around eyes; many white appressed lanceolate hairs; with a short median longitudinal thoracic groove just in front of beginning of steep posterior declivity.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one tenth of diameter of ALE. Posterior row wider than anterior row in ratio of 13 : 12, wider than middle row in ratio of 13 : 11. Quadrangle of laterals wider than long in ratio of 13 : 8. Total eye space occupies nine twentieths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 20 : 10.5 : 3 : 10. AME separated from one another by about three twentieths of their diameter, from ALE by slightly more than this. Middle eyes closer to ALE than to PLE in ratio of 4 : 5. Height of clypeus equal to seven twentieths of the diameter of AME. Clypeus decorated with a thick mat of yellowish white hair, a few long whitish bristles which protrude through the hairy mat, and the usual three bristles in the lower angle between AME.

Chelicerae. Robust; much swollen in front at base; parallel, vertical; basal segment 1.00 mm. long. Fang robust, evenly curved. Fang groove with two small promarginal teeth and a single, robust, moderately fissidentate tooth (Fig. 226).

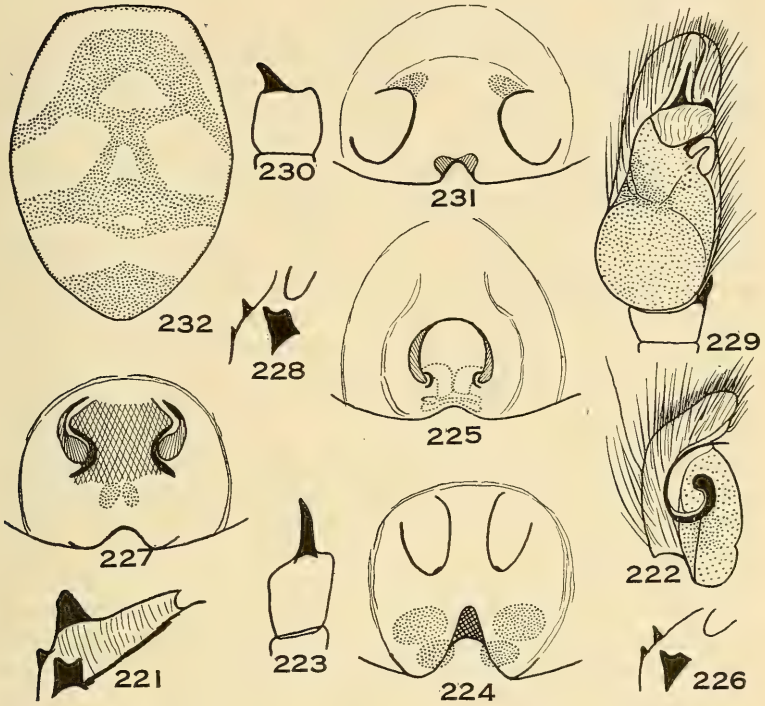
Maxillae. Parallel; longer than wide in middle in ratio of about 2 : 1; only moderately concave along outer border; outer distal angle well rounded.

Lip. Longer than wide in ratio of 25 : 18; basal excavations reach about one third of length of organ; reaches nearly two thirds the length of the maxillae; sternal suture slightly procurved.

Sternum. Elongate scutiform; longer than wide in ratio of 5 : 3; widest between second coxae; anterior border considerably narrower than base of lip; quite convex in posterior two thirds; posterior end not extended between fourth coxae which are separated by five eighteenths of their diameter. Anterior coxae much the stoutest.

Legs. 4123. Tibial index of first leg 17, of fourth leg 16.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.41	.96	.98	.76	.57	4.68
2.	1.21	.75	.70	.64	.48	3.78
3.	1.26	.64	.64	.71	.53	3.78
4.	1.60	.71	.96	.89	.58	4.74



External Anatomy of Spiders

Fig. 221. *Beata levispina*, male cheliceral teeth.
Figs. 222–223. *B. levispina*, male palp, ventral view; and palpal tibia, retrolateral view.
Fig. 224. *B. levispina*, epigynum, ventral view.
Fig. 225. *B. munda* Chickering; epigynum, ventral view.
Fig. 226. *B. variegata*, female cheliceral teeth.
Fig. 227. *B. variegata*, epigynum, ventral view.
Fig. 228. *B. venusta* Chickering; male cheliceral teeth.
Figs. 229–230. *B. venusta* Chickering; male palp ventral view; and palpal tibia, retrolateral view.
Fig. 231. *B. zeteki* Chickering; epigynum, ventral view.
Fig. 232. *B. zeteki* Chickering; abdomen, dorsal view.

First leg moderately enlarged. All legs with a moderate supply of light colored hair and dark bristles, but with no fringes.

Spines. First leg: femur dorsal 0–1–1–1–0, prolateral distal 1; patella 0; tibia only ventral 2–2–2, promarginal series occupying just a little more than the distal half of the segment, the retromarginal series about the distal three fifths; metatarsus only ventral 0–2–2. Second leg: femur and patella as in first; tibia only prolateral 0–1, ventral 1r–1r–2; metatarsus only prolateral 0–1, ventral 2–2. Third leg: femur and patella as in first except femur retrolateral distal 1; tibia prolateral 0–1, retrolateral 0–1, ventral 0–0–2; metatarsus prolateral and retrolateral 1–2, ventral 0–2. Fourth leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 1; patella 0; tibia only retrolateral 0–1, ventral 0–0–2; metatarsus prolateral 0–1–1, retrolateral 0–1, ventral 0–2.

Abdomen. Ovoid; longer than wide in ratio of 22 : 13; widest about the middle; anal tubercle and spinnerets as usual in the genus; position of colulus not indicated; tracheal spiracle near base of spinnerets, without a tubercle.

Epigynum. Resembles somewhat that of *M. pallens* F.Cambridge from Guatemala. Epigynal plate about as long as wide; notched in middle of posterior margin; in anterior half is a central low septum constricted behind the middle, then broadened and constricted again (Fig. 227).

Color in alcohol. Carapace: light reddish brown overlaid with much white lanceolate hair and iridescent scales especially in interocular area; a narrow transverse irregular light band just behind PLE; eyes on black spots. All mouth parts yellowish white. All legs yellowish white, banded, spotted, and sometimes striped with reddish brown. Abdomen: a narrow central light brown stripe with many iridescent scales extends nearly from base to anal tubercle; this stripe separates a series of eight dark reddish brown spots which are in turn separated by short white bars; the two anterior pairs of brown spots include a small white spot in each anteromedial corner; lateral sides yellowish white streaked with reddish brown; venter yellowish white with a broad central reddish brown stripe extending throughout and enclosing a pair of rows of yellowish dots.

Type locality. Female hypotype from Boquete, R. P., July, 1939. Several additional males and females from the same locality and at the same time.

Beata venusta spec. nov.

Figures 228–230

This species appears to be closely related to *B. flavolineata* (F. Cambridge), but there are good specific differences such as color and palpal characters.

Male holotype. Total length 3.26 mm. Carapace 1.66 mm. long, 1.28 mm. wide just behind PLE which occupy seventeen nineteenths of width of carapace at their level, .83 mm. tall and, therefore, about .65 as tall as wide; surface finely granulated, especially in interocular area; many simple black hairs and white lanceolate hairs as noted later; a short median longitudinal thoracic groove nearly half way from opposite PLE to beginning of steep posterior declivity.

Eyes. Seen from above, anterior row recurved so that a line tangent to dorsal borders of AME lies just slightly above dorsal borders of ALE. Posterior row wider than anterior row in ratio of 51 : 47; wider than middle row in ratio of 51 : 44. Quadrangle of laterals wider than long in ratio of 51 : 30. Total eye space occupies thirty-five seventy-sevenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 16 : 8 : 2 : 7. AME separated from one another by one sixteenth of their diameter, from ALE by the same distance. Middle eyes closer to ALE than to PLE in ratio of 5 : 4. Height of clypeus equal to one eighth of the diameter of AME. Clypeus decorated with a few white lanceolate hairs, a ventral fringe of bristles, and the usual three bristles in lower angle between AME.

Chelicerae. Very slightly porrect; slightly divergent; moderately produced; basal segment .53 mm. long. Fang moderately robust, evenly curved. Fang groove with two small promarginal teeth and a single robust fissidentate tooth, somewhat modified from the typical (Fig. 228).

Maxillae. Essentially parallel; longer than wide in middle in ratio of about 2 : 1; ridged along middle of retrolateral surface; outer distal angle with a minute hook projected forward.

Lip. Longer than wide in ratio of 14 : 11; basal excavations reach about one third the length of the organ; reaches to middle of maxillae. Sternal suture very gently procurved.

Sternum. Somewhat scutiform; longer than wide in ratio of 31 : 23; widest between second coxae; quite convex in posterior four fifths anterior border nearly as wide as base of lip; posterior end a blunt point, not extended between fourth coxae which are separated by one third of their diameter. Anterior coxae considerably the stoutest.

Legs. 4132. Tibial index of first leg 31, of fourth leg 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
		(All measurements in millimeters)				
1.	.90	.39	.46	.51	.32	2.58
2.	.76	.42	.45	.38	.32	2.33
3.	.76	.40	.42	.45	.32	2.35
4.	.90	.45	.64	.60	.32	2.91
Palp	.51	.16	.11	—	.46	1.24

Fourth legs much the stoutest. All legs with a moderate supply of simple and white lanceolate hair, but with no fringes.

Spines. First leg: femur dorsal 0–1–1–1, prolateral only distal 1; patella prolateral 0–1(very small)–0; tibia only ventral 2–2–2, promarginal series occupying only distal half of segment, the retromarginal series about the distal two thirds; metatarsus only ventral 0–2–2. Second leg: femur dorsal 0–1–1–1, prolateral distal 2, retrolateral distal 1; patella 0; tibia only ventral 1r–1r–1r; metatarsus only prolateral 0–1, ventral 2–1r. Third leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 2; patella only retrolateral 0–1–0; tibia only retrolateral 0–1–0, ventral 0–0–1p; metatarsus prolateral 0–2, retrolateral 1–2, ventral 0–2. Fourth leg: femur as in third except retrolateral distal 1; patella 0; tibia only ventral 0–0–2; metatarsus prolateral 0–1, retrolateral 0–2, ventral 0–2. Palpal spines: only femur dorsal 0–1–1.

Palp. Femur only moderately curved dorsoventrally; patella and tibia both short, the latter about two thirds as long as the former; tibial retrolateral apophysis a simple spur directed obliquely forward; bulb moderately swollen, largely overlaps tibia, deeply excavated contiguous to tibial spur; bulb with two lobes, the small anterior rugulose lobe drawn out into a distinct tubercle on retrolateral side, from center of its anterior surface arises the embolus, a slender, sharply pointed spine (Figs. 229–230).

Abdomen. Ovoid; longer than wide in ratio of 26 : 15; widest about one third from base; anal tubercle and spinnerets as usual in the genus; position of colulus not indicated; tracheal spiracle near base of spinnerets and without a tubercle.

Color in alcohol. Carapace: generally a rich reddish brown with eyes on black spots and with many black intercommunicating lines nearly everywhere; many white lanceolate hairs which seem to occur mostly beneath ALE and backward to opposite PLE as an irregular stripe; the white hairs also occur from ALE beneath and around PLE to steep posterior declivity, they are very loose and doubtless many are re-

moved by handling. All mouth parts reddish brown, including palps which have a few whitish hairs on dorsal side of femora. Legs: first pair all reddish brown except the yellowish white tarsi and patellae which are yellowish white at base on prolateral and ventral sides; other legs yellowish white with reddish brown spots and patches the most definite of these being the distal ends of femora two to four. Abdomen: central dorsal area reddish brown with a few dirty white lanceolate hairs; a whitish band at base extends dorsolaterally to bound the central brown area to anal tubercle; lateral sides brownish with very narrow yellowish stripes; venter reddish brown bounded by a row of yellowish dots on each side; lung areas yellowish white.

Type locality. Male holotype and two male paratypes from El Valle, R. P., July, 1936.

Beata zeteki spec. nov.

Figures 231–232

Female holotype. Total length 3.39 mm. Carapace 1.73 mm. long, 1.36 mm. wide just behind PLE which occupy fifty-five sixty-thirds of width of the carapace at their level, .83 mm. tall and, therefore, .61 as tall as wide; with a moderate amount of both black lanceolate and white lanceolate hair; descends very slightly from PLE to steep posterior declivity which is very abrupt; a very short median longitudinal thoracic groove about half way from PLE to beginning of steep posterior declivity which occurs a little more than half way from PLE to posterior border.

Eyes. Anterior row recurved so that a line tangent to dorsal borders of AME just misses the dorsal borders of ALE. Posterior row wider than anterior row in ratio of 11 : 10, wider than middle row in ratio of 55 : 46. Quadrangle of laterals wider than long in ratio of 55 : 34. Total eye space occupies almost exactly half the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 16 : 8 : 1.75 : 7. AME separated from one another by scarcely one sixteenth of their diameter, from ALE by one tenth of their diameter. Middle eyes slightly closer to ALE than to PLE. Height of clypeus equal to about three sixteenths of the diameter of AME. Clypeus decorated by a brush of white lanceolate hairs, the longest of which occur on ventral margin and overlap bases of chelicerae, two long white bristles beneath each AME, and three brownish bristles in lower angle between AME.

Chelicerae. Fairly robust, parallel, vertical; quite gibbous in front,

especially in middle; basal segment .51 mm. long. Fang fairly robust, evenly curved. Fang groove with two promarginal teeth, the more medial one small, the other much larger; a single robust, retromarginal, deeply fissidentate tooth.

Maxillae. Parallel; longer than wide in middle in ratio of 21 : 12; moderately notched in middle of outer border; outer distal angle well rounded and without a tubercle or hook; somewhat excavated and strongly chitinized contiguous to lip.

Lip. Longer than wide in ratio of 5 : 4; basal excavations reach about one third of length of organ; reaches just beyond the middle of maxillae. Sternal suture straight or very slightly procurved.

Sternum. Elongate scutiform; longer than wide in ratio of 35 : 22; widest between second coxae, nearly as wide between first coxae; anterior border slightly narrower than base of lip; convex throughout its length with greatest convexity between third coxae; posterior end a blunt point not extended between fourth coxae which are separated by one third of their diameter. Anterior coxae much the stoutest.

Legs. 4123. Tibial index of first leg 20, of fourth leg 16.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.96	.63	.63	.58	.38	3.18
2.	.90	.51	.56	.51	.35	2.81
3.	.95	.45	.45	.57	.32	2.74
4.	1.00	.51	.67	.64	.41	3.23

All legs with a moderate supply of simple hair but with no fringes.

Spines. First leg: femur only dorsal 0–1–1–1 and prolateral distal 2; patella 0; tibia only ventral 2–2–2, promarginal series occupying just a little more than distal half of segment, retromarginal series about the distal four fifths; metatarsus only ventral 0–2–2. Second leg: femur and patella as in first except femur retrolateral distal 1; tibia only prolateral 0–1, ventral 1r–1r–2; metatarsus only ventral 0–2–2. Third leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 1; patella 0; tibia prolateral and retrolateral 0–1, ventral 0–0–2; metatarsus prolateral 1–2, retrolateral 0–2, ventral 0–2. Fourth leg: femur and patella as in third; tibia only retrolateral 0–1, ventral 0–1p–0–2; metatarsus prolateral and retrolateral 0–1, ventral 0–1. Palpal spines: only femur dorsal 0–0–1.

Abdomen. Ovoid; longer than wide in ratio of 29 : 21 (broader than usual in the genus); widest just before the middle; anal tubercle and spinnerets retracted but the latter plainly more robust than usual in

the genus; position of colulus not observed; tracheal spiracle near base of spinnerets and without a tubercle.

Epigynum. Epigynal plate with a posterior median marginal notch which has right and left covered extensions; just in front of posterior margin are two deep depressions separated by a septum considerably broader than the long diameter of one of the depressions (Fig. 231).

Color in alcohol. Carapace: generally reddish brown, eyes on black spots; a gently recurved narrow lighter band occurs just behind PLE; steep posterior and lateral sides to PLE covered with black lanceolate hair; white lanceolate hair around eyes and backward to posterolateral corners. Chelicerae dark reddish brown; maxillae and lip light brown with whitish tips. Sternum light reddish brown. Palps and all legs yellowish white except fourth patellae and tibiae which are reddish brown at distal ends dorsally and laterally. Abdomen: yellowish white dorsally with a striking reddish brown pattern consisting of a series of four cross bars, the first very narrow at base, the second narrow laterally but greatly broadened medially and enclosing a small yellowish white spot, the third is broad and connected in front with the second, the fourth covers the tip of the abdomen (Fig. 232); the narrow basal band extends as a stripe along the lateral sides and connects with each reddish brown bar; venter yellowish white with a large, nearly square, reddish brown patch just anterior to spiracle, between the square and genital groove is a reddish brown dotted area.

Type locality. Holotype female from Ft. Davis, C. Z., August, 1936. No paratypes.

Genus Cheliferoides F. Cambridge, 1901

Cheliferoides planus spec. nov.

Figures 233–236

There is some doubt about the proper placement of this species. It seems to lie close to this genus if not actually in it. Rather than make a new genus for it I consider it better to describe it carefully and leave it here until further knowledge is available concerning its affiliations. My single specimen is somewhat damaged but its important features are clear enough.

Female holotype. Total length 5.18 mm. Carapace 1.98 mm. long, 1.60 mm. wide considerably behind PLE which occupy thirty-seven forty-thirds of total width of carapace at their level, .57 mm. tall and, therefore, about .36 as tall as wide; rises gently from AME to PLE.

then descends very slightly to steep posterior declivity which begins four fifths of the distance from PLE to posterior border; a medial longitudinal thoracic groove of moderate length about half way from PLE to posterior declivity; lateral sides well rounded from PME with widest place opposite thoracic groove (Figs. 233–234).

Eyes. Anterior row recurved so that dorsal borders of AME are slightly dorsal to those of ALE. Anterior row slightly wider than posterior row, wider than middle row in ratio of 55 : 48. Quadrangle of laterals wider than long in ratio of 55 : 31. Total eye space occupies about seven eighteenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 16 : 9 : 2.5 : 7.5. AME nearly contiguous, separated from ALE by one eighth of their diameter. Middle eyes closer to PLE than to ALE in ratio of about 7 : 8. Height of clypeus equal to one eighth of the diameter of AME. Clypeus decorated only by a few long yellowish white hairs and three long upturned yellowish bristles in lower angle between AME.

Chelicerae. Parallel; vertical or slightly porrect; with prominent basal boss; swollen considerably in front obliquely across the middle; basal segment of moderate size, .46 mm. long. Fang of moderate size, evenly curved. Fang groove distinct, with two promarginal teeth, the inner small, the outer of moderate size; retromargin with a single, low, broad, typically fissidentate tooth.

Maxillae. Slightly convergent; longer than wide in ratio of about 2 : 1; only moderately concave in middle of outer border; palp inserted into basal two fifths; outer distal angle about sixty degrees, with margin from angle to notch irregular and strongly chitinized.

Lip. As wide as long; basal excavations reach slightly more than one third the length of the organ; reaches about seven twelfths of the length of maxillae. Sternal suture gently procurved.

Sternum. Scutiform; longer than wide in ratio of about 4 : 3; widest between second coxae; anterior border almost as wide as base of lip and anterior coxae almost as wide apart as two thirds the width of sternum; posterior end a blunt point not extended between fourth coxae which are separated by one half their diameter.

Legs. 1243. Tibial index of first leg 17, of fourth leg 10.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.28	.77	1.15	.77	.39	4.36
2.	1.02	.51	.64	.57	.32	3.06
3.	.80	.45	.51	.57	.35	2.68
4.	.83	.52	.77	.59	.32	3.03

First leg chelate; with femur, patella, and tibia much thickened (Fig. 235). First pair of legs with a well developed ventral fringe on tibia; other segments with a moderate supply of hair. Remaining pairs of legs with little hair. Palps with tibiae and tarsi flattened into somewhat club-shaped organs, with well developed prolateral fringes on both of these segments.

Spines. First leg: femur dorsal 0–1–1–0 on right side; 0–1–1–1 on left, prolateral 0–2–1–0 on right and 0–1–1–0 on left; patella 0; tibia only ventral 2–2–2 (quite well matched and occupying the distal two thirds of segment; metatarsus only ventral 0–2–2; all tibial and metatarsal spines robust and springing from enlarged bases. Second leg: femur only dorsal 0–1–1–1; patella 0; tibia only ventral 2–2–2 (all long and slender); metatarsus only ventral 2–2. Third leg: femur only dorsal 0–1–1–1; elsewhere 0. Fourth leg: as in third. Palpal spines: only femur dorsal 0–1–1–0.

Abdomen. Ovoid; longer than wide in ratio of 5 : 3; widest about three fifths from base; anal tubercle a short yellowish cone; spinnerets without unusual features, closely grouped, anterior pair most robust, middle pair slenderest and nearly as long as anterior pair, posterior pair slightly the longest. Position of colulus not indicated. Tracheal spiracle near base of spinnerets, with indistinct lip and no tubercle.

Epigynum. Epigynal plate somewhat longer than wide; posterior margin without a notch; a lip extends transversely a short distance in front of posterior margin; a semicircular recurved depression occupies anterior half of plate (Fig. 236).

Color in alcohol. Carapace: light brown with eyes on black spots and interocular area dark brown; numerous small clear iridescent scales cover entire surface. Palps and chelicerae light brown. Lip and maxillae amber with yellowish white tips. Sternum yellowish, dusted with dark brown. Legs: first pair dark reddish brown, femur and tibia the darkest; others yellowish white with prolateral and retrolateral reddish brown stripes. Abdomen: somewhat damaged; apparently almost entirely unicolorous yellowish white with short black recurved hairs and numerous clear iridescent scales except a faint dark median ventral stripe.

Type locality. Female holotype from Canal Zone Biological Area, July, 1939. No paratypes.

Donaldius gen. nov.

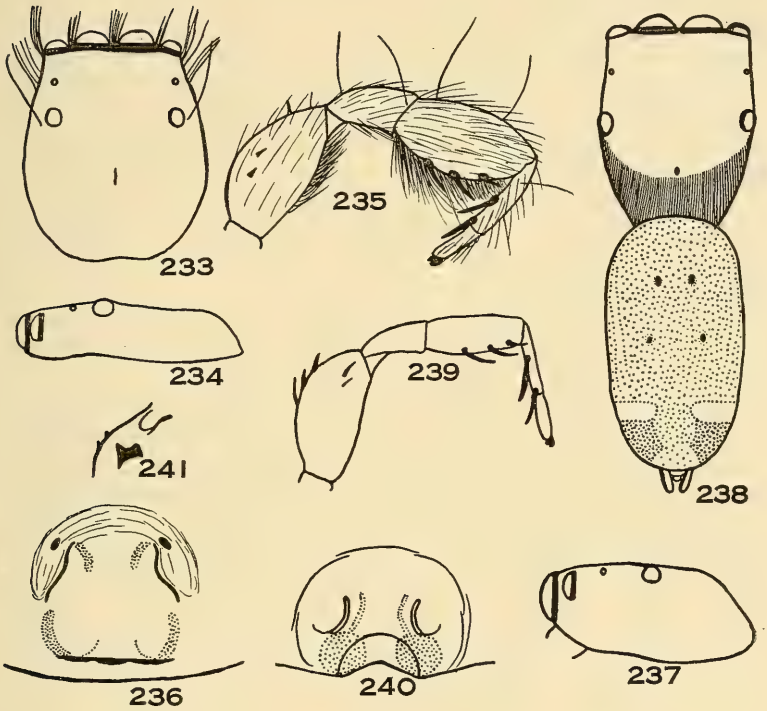
Carapace moderately high, nearly flat dorsally, with lateral sides nearly parallel in cephalic part, widest at level of PLE; with a small, somewhat oval, median, longitudinal thoracic groove close to beginning of steep posterior declivity which occurs about halfway from PLE to posterior border. *Eyes:* anterior row moderately recurved; PME slightly closer to ALE than to PLE; PLE occupy the full width of the carapace; anterior and posterior row about equal in width; quadrangle of laterals considerably wider than long; total eye space occupies somewhat more than one half the length of the carapace. *Clypeus* low. *Chelicerae* vertical, parallel, of moderate size; distinct fang groove with a single, low, fairly robust, fissidentate tooth on retromargin. *Maxillae* parallel, unmodified. *Sternum* somewhat elongate scutiform, moderately broad; widest between second coxae; moderately narrowed between first coxae; moderately convex. *Legs:* 1423; first pair considerably enlarged; without fringes; leg spines somewhat reduced in number. *Abdomen* ovoid; spinnerets of moderate size. *Genotype: Donaldius lucidus* sp. nov.

Donaldius lucidus spec. nov.

Figures 237–241

Female holotype. Total length 4.10 mm. Carapace 1.86 mm. long, 1.28 mm. wide at PLE which occupy the full width of the carapace, .83 mm. tall and, therefore, about .65 as tall as wide; lateral sides nearly parallel from ALE to PLE, nearly vertical over the same region; nearly flat on dorsal surface from AME to steep posterior declivity which begins about halfway from PLE to posterior border; surface finely granulate with very few hairs; with a very small, somewhat oval, median, thoracic groove close to beginning of posterior declivity (Figs. 237–238).

Eyes. Seen from in front, anterior row recurved so that dorsal borders of AME are slightly above those of ALE. Posterior row wider than anterior row in ratio of 30 : 29, wider than middle row in ratio of 30 : 26. Quadrangle of laterals wider than long in ratio of 10 : 7. Total eye space occupies twenty-four forty-firsts of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 19 : 10 : 2.5 : 9. AME barely separated from one another and from ALE. Middle eyes closer to ALE than to PLE in ratio of about 6 : 7. Height of



External Anatomy of Spiders

Figs. 233–234. *Cheliferoides planus* Chickering; carapace dorsal and lateral views.
Fig. 235. *C. planus* Chickering; first leg, prolateral view.
Fig. 236. *C. planus* Chickering; epigynum, ventral view.
Fig. 237. *Donaldius lucidus* Chickering; carapace, lateral view.
Fig. 238. *D. lucidus* Chickering; whole body, dorsal view.
Fig. 239. *D. lucidus* Chickering; first leg, prolateral view.
Fig. 240. *D. lucidus* Chickering; epigynum, ventral view.
Fig. 241. *D. lucidus* Chickering; cheliceral teeth.

clypeus equal to one nineteenth of the diameter of AME. Clypeus decorated only with a few long white lanceolate hairs along ventral margin, a single long white bristle beneath outer boundary of AME, and three long upturned yellowish bristles in lower angle between AME.

Chelicerae. Vertical, parallel; considerably swollen in front; slightly excavated in middle of medial border; basal segment .40 mm. long. Fang of moderate size, evenly curved. Fang groove distinct; promargin with two small teeth; retromargin with a single, fairly robust, low fissidentate tooth (Fig. 241).

Maxillae. Parallel; longer than wide in middle in ratio of about 2 : 1; moderately concave in middle of outer border; outer distal corner somewhat angulate but without tubercle or hook; with well developed scopula along truncature.

Lip. Longer than wide in ratio of 15 : 11; basal excavations reach about one third of length of organ; reaches two thirds the length of maxillae. Sternal suture straight.

Sternum. Somewhat elongate scutiform; longer than wide in ratio of 38 : 23; widest between second coxae; quite convex, especially between second and third coxae; anterior border considerably narrower than base of lip; anterior coxae separated by one half the greatest width of sternum; posterior end blunt and not extended between fourth coxae which are separated by only one eighth of their diameter.

Legs. 1423. Tibial index of first leg 20, of fourth leg 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
		(All measurements in millimeters)				
1.	1.08	.64	.78	.64	.38	3.52
2.	.83	.45	.51	.48	.35	2.72
3.	.77	.38	.51	.51	.35	2.52
4.	1.05	.45	.70	.64	.38	3.22

All legs with a moderate supply of simple hair, but with no special fringes or tufts. First leg considerably enlarged, especially the coxa, femur, patella, and tibia (Fig. 239).

Spines. First leg: femur dorsal 0–0–1–1–1–0, prolateral distal 2; patella 0; tibia only ventral 2–2–2, last pair not terminal, with promarginal series occupying distal five eighths of the segment, the retromarginal series occupying about the distal three quarters; metatarsus only ventral 0–2–2. Second leg: femur dorsal 0–1–1–1–0, prolateral distal 1; patella 0; tibia only ventral 1r–0–2; metatarsus only ventral 0–2–2. Third leg: femur dorsal 0–0–1–1–0, prolateral distal 1; patella

0; tibia 0; metatarsus only prolateral 0–1. Fourth leg: femur dorsal 0–1–1–1–0, retrolateral distal 1; elsewhere as in third. Palpal spines: apparently only femur dorsal 0–0–1.

Abdomen. Almost oval in outline; 2.43 mm. long; longer than wide in ratio of 19 : 9; anal tubercle a broad bisegmentate cone; six spinnerets closely crowded, of moderate size and length, anterior pair stoutest and approximated; position of colulus indicated by a tuft of black hairs; tracheal spiracle near base of spinnerets, with distinct lip but no tubercle.

Epigynum. Simple; with a moderately deep posterior marginal notch; near the middle of the plate are two excurved margins of obscure openings standing far apart (Fig. 240).

Color in alcohol. Carapace: bright reddish brown, with eyes on black spots and many dark streaks along lateral sides and steep declivity; also a rich iridescence which runs to metallic tints due, at least in part, to character of surface rather than to presence of scales. Legs: first pair with light amber coxae, trochanters, and tarsi, with all other segments light brown but darker ventrally and prolaterally; other legs unicolorous yellowish white. Chelicerae and sternum reddish brown; maxillae and lip much the same with yellowish white tips. Abdomen: dorsum generally reddish brown with a rich bronze iridescence, apparently from very minute scales; about one fifth from posterior end is a pair of narrow yellowish white bars separated medially by a continuation of the reddish brown color of the anterior four fifths; behind the bars is a pair of large dark reddish brown spots separated posteriorly by a rounded central light spot; lateral sides narrowly striped in anterior half by alternate reddish brown and yellowish white; behind this region on each lateral side is a yellowish white curved mark connecting posteriorly with the dorsal bar; venter with a broad, dark brown stripe from genital groove to base of spinnerets.

Type locality. Female holotype from El Valle, R. P., July, 1936. No paratypes.

Genus Habronattus F. Cambridge, 1901

Habronattus paratus (Peckham), 1896

Figures 242–245

Habrocestum paratum Peckham, 1896
Pellenes paratus Peckham, 1900
Habronattus paratus F. Cambridge, 1901
P. paratus Petrunkevitch, 1911
P. paratus Banks, 1929

This species was known only from Guatemala until Mr. Banks reported it from Panama in 1929. Banks found one male. I have both sexes from several localities in the Canal Zone. The Peckhams gave the order of legs as 1342. F. Cambridge stated the order of legs in the genus to be 3412 in both sexes. The latter author also stated that the promargin of the fang groove has three teeth, and that there is a small basal dorsal tibial spine present in the species. In view of these discrepancies in the literature and because of the fact that the female has never been described I give below a description of certain features of the male and a detailed description of the female allotype.

Male hypotype. Total length 3.58 mm. Carapace 1.85 mm. long, 1.35 mm. wide at level of PLE which occupy almost the full width of the carapace at their level, .96 mm. tall and, therefore, slightly less than three fourths as tall as wide; gently rises from AME to PLE, then very gently descends to steep posterior declivity which begins midway between PLE and the posterior border; with numerous long black isolated bristles, especially in the ocular area.

Chelicerae. Vertical, parallel; basal segment .55 mm. long. Fang rather small, evenly curved. Fang groove with two promarginal teeth close together, the smaller the more medial; retromargin with a single, fairly robust, stout, somewhat longer tooth (Fig. 242).

Legs. 1342. Tibial index of first leg 19, of fourth leg 18.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.08	.64	.88	.57	.41	3.58
2.	.77	.50	.50	.40	.38	2.55
3.	1.21	.57	.70	.57	.45	3.50
4.	.96	.38	.57	.60	.44	2.95
Palp	.57	.25	.11	—	.51	1.44

First pair of legs considerably the stoutest as well as somewhat the longest; also with a ventral fringe beginning at distal end on promargin of femora and extending throughout the metatarsi, especially heavy on patellae and tibiae; hairs in fringe are black in proximal halves and white in distal halves.

Spines. First leg: femur only dorsal 0–0–1–1–1–1, prolateral distal 2; patella 0; tibia only ventral 2–2–2, not evenly spaced nor well paired; metatarsus only ventral 2–2. Second leg: femur dorsal 0–0–1–1–1, prolateral distal 1, retrolateral distal 2; patella only prolateral 0–1–0; tibia only prolateral 0–1–1–0, ventral 1r–1r–2; metatarsus only prolateral 0–0–1, ventral 2–2. Third leg: femur dorsal 0–1–1–1, pro-

lateral 0–0–1–2, retrolateral only distal 1; patella prolateral and retrolateral 0–1–0; tibia only prolateral 0–1–1–0, ventral 1p–0–2, retrolateral 0–1–1–1–0; metatarsus prolateral and retrolateral 1–2. ventral 2–2. Fourth leg: femur only dorsal 0–1–1–1; patella only retrolateral 0–1–0; tibia only prolateral 0–1–0, retrolateral 0–1–1–0, ventral 1p–1p–1p on right, 1p–0–2 on left; metatarsus prolateral and retrolateral 1–2, ventral 1p–2.

Palp. Tibia, exclusive of apophysis, very short; retrolateral apophysis massive and bluntly rounded at anterior end. Tarsus nearly as broad as long; bulb nearly round, moderately swollen; embolus arises on prolateral side at base, curves regularly along prolateral side to terminate near anterior end of tarsus; tarsal apophysis arises near middle of bulb on prolateral side, soon makes a nearly right angle turn and continues distally to end just beyond anterior margin of tarsus (Figs. 243–244).

Female allotype. Total length 5.15 mm. Carapace 2.43 mm. long, 1.77 mm. wide at level of PLE which occupy nearly all of width of carapace at their level, 1.06 mm. tall and, therefore, about ten seventeenths as tall as wide; essentially the same form as in male.

Eyes. Viewed from in front, anterior row recurved so that a line tangent to dorsal borders of AME just misses contact with dorsal borders of ALE. Posterior row just a little wider than anterior row. Quadrangle of laterals wider than long in ratio of 25 : 18. Total eye space occupies almost exactly half the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 22 : 12 : 3.5 : 10. AME separated from one another by about one twelfth of their diameter, from ALE by about one tenth of their diameter. Middle eyes equidistant from ALE and PLE. Height of clypeus equal to four elevenths of the diameter of AME. Clypeus decorated as follows: a transverse row of six long dark bristles, a ventral fringe of long white hairs, a complete covering of clavate appressed white hairs, and the usual three long bristles in lower angle between AME.

Chelicerae. Anterior surface with many white clavate appressed hairs and a few long white simple hairs. Otherwise essentially as in male, including teeth along the fang groove.

Maxillae. Parallel; longer than wide in middle in ratio of about 22 : 15; moderately notched in middle and only slightly dilated distally.

Lip. Slightly wider than long. Sternal suture probably straight (sternal hair and bristles obscure both lip and bases of maxillae).

Sternum. Longer than wide in ratio of 21 : 13; covered with a thick growth of light hair and longer light bristles; not continued posteriorly between fourth coxae which are nearly contiguous.

Legs. 3412. Tibial index of first leg 25, of fourth leg 20.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.10	.80	.76	.62	.42	3.70
2.	1.00	.66	.60	.52	.39	3.17
3.	1.60	.83	.83	.76	.52	4.54
4.	1.28	.63	.70	.70	.58	3.89

First leg very stout; remnants of a ventral fringe only on first patellae and tibiae.

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral distal 1; elsewhere as in male. Second leg: femur as in first except prolateral distal 2; elsewhere as in male except tibial prolateral 0–1–0 and metatarsal prolateral 0. Third leg: femur dorsal 0–0–1–1 and prolateral 0–0–1–1; patella and tibia as in male; metatarsus as in male. Fourth leg: as in male except tibia prolateral 0–1–0, retrolateral 1–1–1, ventral 1p–0–2.

Abdomen. Ovoid; longer than wide in ratio of 43 : 27; widest just before the middle; anal tubercle a short broad flattened cone; spinnerets of moderate length, all slender; position of colulus indicated by a minute cone and a tuft of hairs; tracheal spiracle near base of spinnerets and without a tubercle.

Epigynum. Unlike that usually found in northern members of the genus; at some distance from posterior border there is a strongly chitinized, transverse lip beneath which is an opening (Fig. 245).

Color in alcohol. Carapace generally a light brown overlaid with many white clavate appressed hairs and a few long simple white hairs; eyes on black spots; brown ground color with many black curved lines and intercommunicating black spots; behind PLE is a broad, transverse, lighter colored bar from which two indefinite light streaks pass backward nearly to posterior border. Sternum light amber. Legs and palps different shades of light brown, all overlaid with many white clavate appressed hairs. Abdomen: generally very dark brown; with a series of poorly defined yellowish spots; there is one of these spots at each anterolateral angle, two small ones just anterior to the first of two pairs of dorsal sigilla, a transverse row of four across the middle of the abdomen, still further posterior another transverse row of three rather better defined spots bordered with black hair, another pair of yellowish spots just anterior to anal tubercle; laterally the abdomen is finely striped with alternate light and dark; venter with a broad central dark stripe containing two poorly defined yellowish stripes and bordered on each side by a bright yellowish white stripe.

Type locality. Male hypotype and female allotype from Canal Zone Biological Area, July, 1939. Numerous males and females from the following localities: Canal Zone Biological Area, June–July, 1934; June–Aug., 1936; June–Aug., 1939; Ft. Randolph, C. Z., Aug., 1936; C. Z. Forest Reserve, C. Z., July–Aug., 1939; France Field, C. Z., Aug., 1939; Chilibre, C. Z., July, 1939.

Genus Metaphidippus F. Cambridge, 1901

Petrunkevitch ('25) listed thirteen species of Metaphidippus (Dendryphantes) known to occur in Panama. I have shown reasons why *M. levispinus* F. Cambridge should be transferred to the genus Beata. Banks ('29) identified five species and placed them in the genus Dendryphantes. His *D. dentiger* F. Cambridge is, according to my view, a new species, probably belonging in the genus Paraphidippus. *Dendryphantes perplexans* Chamberlin and Ivie appears to be a synonym of *M. cupreus* F. Cambridge. I seem to have six new species to add to the list. Including the changes which I have indicated, we may list the known species as follows: *M. bicavatus* F. Cambridge; *M. bispinosus* F. Cambridge; *M. centralis* (Peckham); *M. cupreus* F. Cambridge; *M. expallidatus* F. Cambridge; *M. facetus* sp. nov., *M. fastosus* sp. nov.; *M. iridescens* F. Cambridge; *M. laetabilis* (Peckham); *M. lanceolatus* F. Cambridge; *M. latus* sp. nov.; *M. laetificus* sp. nov.; *M. laxus* sp. nov.; *M. longipalpus* F. Cambridge; *M. momus* F. Cambridge; *M. ochraceus* F. Cambridge; *M. octonotatus* F. Cambridge; *M. perscitus* sp. nov.; *M. quadrinotatus* F. Cambridge. Seven of these are known only from females. The genus Metaphidippus is one of the most successful among spiders in Central and North America. Students of this group have differentiated many new species during the last few years. I am confident there are many more to be discovered in Central America. When knowledge concerning the genus is sufficiently far advanced, I believe a fertile field for the study of evolution in the group will be offered.

Key to the species of Metaphidippus from Panama

Males

1. Palpal bulb with two distinct spines arising from distal lobe.....2
1. Palpal bulb with only one distinct spine, the embolus.....3
2. Chelicerae considerably produced; retromarginal tooth on fang groove near base of fang. Palp: the smaller of distal tarsal spines on prolateral

side; the larger of distal tarsal spines somewhat tuberculate; tibial retrolateral apophysis broad at base, somewhat geniculate just beyond middle *M. facetus*, (p. 288)

2. Chelicerae not notably produced (variable); retromarginal tooth on fang groove remote from base of fang. Palp: the smaller of distal tarsal spines on retrolateral side; the larger distal tarsal spine evenly curved; tibial retrolateral apophysis small, narrow at base where it is strongly geniculate *M. bispinosus*, (p. 287)
3. (Taken from type) Chelicerae not notably produced; retromarginal tooth on fang groove near middle. Palp: embolus a slender, gently curved, distal spine arising from middle of anterior border of bulb; tibial apophysis robust at base, slender and somewhat geniculate near tip..... *M. centralis*, (p. 287)
3. Not with combination of characters given above.....4
4. Chelicerae mildly produced; retromarginal tooth on fang groove near middle, long, slender, curved toward base of fang. Palp: embolus a distal, moderately stout spine arising on retrolateral side, somewhat geniculate in distal third; tibial apophysis a moderately short, stout, nearly straight spine..... *M. fastosus*, (p. 293)
4. Not with combination of characters given above.....5
5. Chelicerae strongly produced; fang with an inner tooth near base; basal segment with a robust blunt prolateral tooth at base of fang; retromarginal tooth on fang groove broad at base, near base of fang. Palp: embolus a long, slender, strongly curved spine arising on retrolateral side of distal rugulose lobe; tibial apophysis a moderately stout, nearly straight spur... *M. laetabilis*, (p. 297)
5. Not with combination of characters given above.....6
6. Chelicerae moderately produced; retromarginal tooth on fang groove remote from base of fang, near promarginal teeth. Palp: embolus a stout distal spine, pointed and gently hooked in distal third; tibial apophysis a sharply pointed, moderately stout spur, directed somewhat ventrally.... *M. lanceolatus*, (p. 299)
6. Not with combination of characters given above.....7
7. Chelicerae much produced; a blunt prolateral tubercle at base of fang; retromarginal tooth of fang groove moderately stout, curved toward base of fang. Palp: embolus a short, slender, nearly straight distal spine arising near middle of anterior border; tibial apophysis stout at base, strongly geniculate near middle and somewhat spiraloid..... *M. latus*, (p. 304)
7. Not with combination of characters given above.....8
8. Chelicerae considerably produced; with a very large retromarginal tooth on fang groove, remote from base of fang. Palp: embolus a stout, distal, distinctly spiraloid spine arising near middle of anterior border; tibial apophysis a moderately robust hook..... *M. laetificus*, (p. 299)
8. Not with combination of characters given above.....9

9. Chelicerae much produced; basal segment with a blunt prolateral tooth near base of fang; retromarginal tooth on fang groove a moderately robust hook, curved toward base of fang. Palp: embolus a short irregular distal spine arising near middle of anterior border and moderately curved retrolaterally; tibial apophysis a moderately long, fairly stout, nearly straight spur ..... *M. laxus*, (p. 306)
9. Not with combination of characters given above 10
10. Chelicerae much produced; basal segment with a blunt prolateral tubercle at base of fang; retromarginal tooth on fang groove a robust hook near middle. Palp: embolus a slender spine arising on retrolateral side, passing obliquely to cymbium; tibial apophysis short, sharply pointed, curving slightly downward ..... *M. longipalpus*, (p. 311)
10. Chelicerae strongly produced; retromarginal tooth on fang groove rather small, remote from base of fang, near two promarginal teeth. Palp: embolus a rather short, distal, robust spine arising near middle of anterior border, with two small lateral distal points; tibial apophysis short, stout, blunt ..... *M. perscitus*, (p. 313)

Females

On the basis of present knowledge it seems almost impossible to work out a helpful key to the fourteen known kinds of females.

Metaphidippus bicavatus F. Cambridge, 1901

Dendryphantes bicavatus Petrunkevitch, 1911
D. bicavatus Petrunkevitch, 1925

So far as I know, this species has not been seen since the original collection studied by Cambridge. It has not appeared in my collection.

Metaphidippus bispinosus F. Cambridge, 1901

Dendryphantes bispinosus Petrunkevitch, 1911
D. bispinosus Petrunkevitch, 1925

Cambridge had this species from Panama, Costa Rica and Guatemala but it has not yet appeared in my collection and, so far as I know, it has not been collected since the original discovery.

Metaphidippus centralis (Peckham), 1896

Dendryphantes centralis Peckham, 1896
M. centralis F. Cambridge, 1901
D. centralis Petrunkevitch, 1911
D. centralis Petrunkevitch, 1925

The Peckhams had five females and one male from Panama, all regarded as belonging to a single species. They are all preserved in the Peckham collection in the Museum of Comparative Zoölogy where I have had the opportunity to examine them. Three of the females are mature but they are not all of one species. Two of them are smaller and probably belong with the male. The other female, the largest of the lot, and the one from which Mr. Emerton made the drawing used by the Peckhams is not a Metaphidippus according to the current understanding of that genus but a Beata. It should be carefully studied. The chelicerae are strongly geniculate near their bases; the retromarginal tooth is fissidentate; and there are other Beata characters. This species has not yet appeared in my collection.

Metaphidippus cupreus F. Cambridge, 1901

Dendryphantes cupreus Petrunkevitch, 1911
D. cupreus Petrunkevitch, 1925
D. cupreus Banks 1929
D. perplexans Chamberlin and Ivie, 1936

I have a strong suspicion that this is the female of *M. laetabilis* (Peckham), but I cannot be certain at this time. I have the species in my collection from the following localities: Canal Zone Biological Area, June–July, 1934; June, Aug., 1936; July, 1943–May, 1944; Frijoles, C. Z., Aug., 1936; Madden Dam region, C. Z., Aug., 1936; La Campana, R. P. (Zetek), May-June, 1939.

Metaphidippus expallidatus F. Cambridge, 1901

Dendryphantes expallidatus Petrunkevitch, 1911
D. expallidatus Petrunkevitch, 1925

This is another species, known only from the female, which seems not to have been taken since the original collection. It has not yet been found in my collection up to the present time.

Metaphidippus facetus spec. nov.

Figures 246–250

Male holotype. Total length 3.64 mm. Carapace 1.68 mm. long 1.22 mm. wide just behind PLE which occupy eleven twelfths of the width of the carapace at their level, .81 mm. tall and, therefore, about

two thirds as tall as wide; surface, especially in interocular area, finely granulate; a few hairs except the white lanceolate hairs which produce the white spots and marks to be noted later; a very short median longitudinal thoracic groove not far from beginning of steep posterior declivity which occurs about half way from posterior border of PLE to posterior margin of carapace.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of ALE lie slightly dorsal to borders of AME. Posterior row slightly wider than anterior row. Middle row narrower than anterior row in ratio of 42 : 45. Quadrangle of laterals wider than long in ratio of 25 : 16. Total eye space occupies half the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 15 : 8 : 1.75 : 7. AME contiguous, separated from ALE by one fifteenth of their diameter. Middle eyes slightly closer to ALE than to PLE. Height of clypeus equal to about four fifteenths of the diameter of AME (clypeus hidden by covering of white hair). Clypeus decorated by a complete covering of white lanceolate hair, two long white bristles beneath each AME, and the usual three bristles in lower angle between AME.

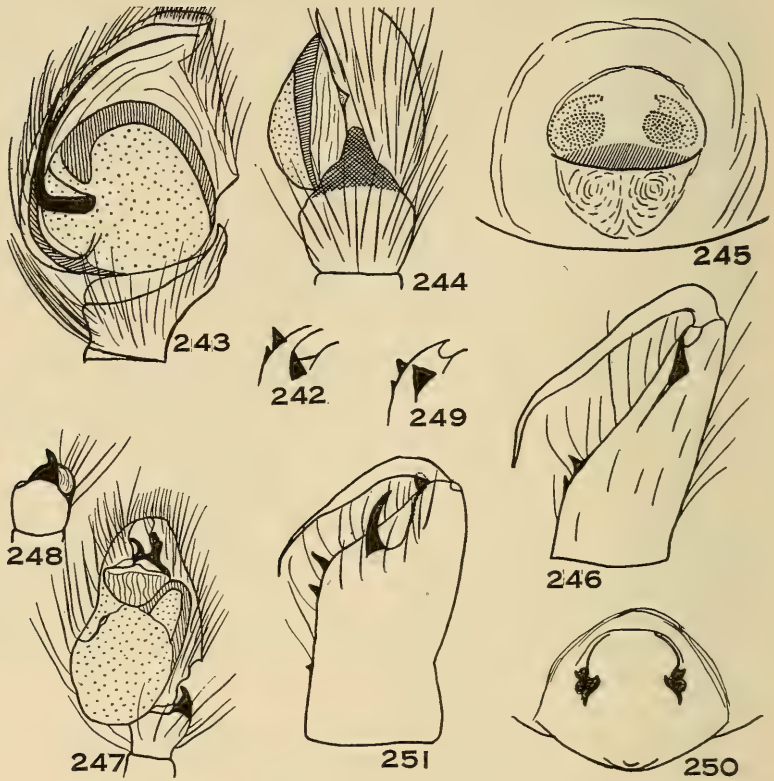
Chelicerae. Porrect, divergent from bases, strongly produced; with basal segment .74 mm. long. Fang long, slender, sinuous, attenuate distally. Fang groove with two small promarginal teeth near inner (medial) end hidden by maxillae; a single fairly stout retromarginal tooth about one fourth of length of groove from base of fang; a low sinuate ridge extends from base of retromarginal tooth toward medial end of groove for some distance, not present in all paratypes (Fig. 246, drawn largely from a paratype).

Maxillae. Parallel; longer than wide in middle in ratio of 7 : 3; outer distal angle with a distinct tubercle; quite concave along middle of outer border; palp inserted into basal half.

Lip. Longer than wide in ratio of 11 : 10; basal excavations reach about one third of length of organ; reaches to middle of maxillae. Sternal suture gently procurved.

Sternum. Elongate scutiform; longer than wide in ratio of 17 : 10; widest between second coxae; anterior border slightly wider than base of lip; blunt at posterior end and not extended between fourth coxae which are separated by about one seventh of their diameter. Anterior coxae much the stoutest.

Legs. 1423. Tibial index of first leg 20, of fourth leg 12.



External Anatomy of Spiders

Fig. 242. *Habronattus paratus*, male cheliceral teeth.
Figs. 243–244. *H. paratus*, male palp, ventral and retrolateral view.
Fig. 245. *H. paratus*, epigynum, ventral view.
Fig. 246. *Metaphidippus facetus* Chickering; male chelicera.
Figs. 247–248. *M. facetus* Chickering; male palp, ventral view; and palpal tibia, retrolateral view.
Fig. 249. *M. facetus* Chickering; female cheliceral teeth.
Fig. 250. *M. facetus* Chickering; epigynum, ventral view.
Fig. 251. *M. fastosus* Chickering; male chelicera.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.97	.58	.70	.57	.38	3.20
2.	.71	.39	.45	.45	.32	2.32
3.	.75	.32	.45	.45	.30	2.27
4.	.90	.38	.69	.59	32.	2.88
Palp	.62	.19	.15	—	.58	1.54

Legs with a moderate supply of light colored hair but with no definite fringes. First leg much the stoutest.

Spines. First leg; femur only dorsal 0–1–1–1 and prolateral distal 1; patella 0; tibia only ventral 0–2–2–2, nearly evenly paired and occupying distal two thirds of segment; metatarsus only ventral 0–2–2. Second leg: femur and patella as in first; tibia only prolateral 0–1, ventral 0–1r–2; metatarsus as in first. Third leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 1; patella 0; tibia only ventral 0–0–2 and retrolateral 0–1; metatarsus prolateral 0–2, retrolateral 0–1, ventral 0–2. Fourth leg: metatarsus prolateral and retrolateral 0–1, ventral 0–1; elsewhere as in third.

Palp. Femur somewhat curved dorsoventrally; both patella and tibia short; tibial retrolateral apophysis a short spur, stout at base, somewhat hooked distally toward bulb; bulb considerably swollen, with two distal spines, the inner one is smaller, attenuate distally and turned toward prolateral side; the larger tarsal spine is somewhat blunt distally, with minute terminal serrations (Fig. 247).

Abdomen. Ovoid; longer than wide in ratio of 31 : 17; widest about one third from base; anal tubercle a short, light colored cone; spinnerets as usual in the genus; tracheal spiracle near base of spinnerets and without tubercle.

Color in alcohol. Carapace: generally a rich mahogany brown with many fine intercommunicating black lines; white hair on clypeus extends laterally to anterior border of PLE; a narrow white marginal stripe due to white lanceolate hairs extends from clypeus to posterolateral angle on each side; an incomplete narrow white stripe occurs from PLE to near posterior border; eyes on black spots. Sternum a dark mahogany brown. Chelicerae mahogany brown, streaked with black lines; other mouth parts with different shades of the same, also streaked with black and tipped with yellowish white. Palps lighter brown with white lanceolate hairs especially on dorsal side of femur. Legs: first pair generally brown with white appressed lanceolate hairs; others yellowish white spotted with reddish brown. Abdomen: dorsal area bright reddish brown with three pairs of obscure small lighter

colored spots; at each anterodorsal angle occurs a white spot which extends for a short distance along dorsolateral region and then breaks into a series of small white spots reaching nearly to spinnerets; lateral regions bear alternate narrow brown and yellowish white stripes; venter with a broad brown stripe containing near center two rows of small yellowish dots and bordered on each side by a more conspicuous row of the same kind of dots; considerable iridescence over dorsal and lateral regions due to presence of scales similar to those on carapace.

Female allotype. Total length 4.03 mm. Carapace 1.73 mm. long, 1.28 mm. wide, .90 mm. tall. Other features essentially as in male.

Eyes. Seen from in front, anterior row recurved as in male. Posterior row wider than anterior row in ratio of 56 : 49, wider than middle row in ratio of 28 : 23. Quadrangle of laterals wider than long in ratio of 14 : 9. Total eye space occupies half the length of carapace. Ratio of eyes AME : ALE : PME : PLE = 16 : 9 : 2 : 8.5. AME not quite contiguous. Middle eyes closer to ALE than to PLE in ratio of 17 : 22. Other features essentially as in male.

Chelicerae. Parallel, vertical, moderately robust; not produced as in male; basal segment .60 mm. long. Fang of moderate size, evenly curved. Fang groove with one extremely small promarginal tooth and another of moderate size nearby; a single fairly robust retromarginal tooth (Fig. 249). From certain angles the retromarginal tooth resembles a modified fissidentate tooth but is not here regarded as such.

Maxillae. Essentially as in male except outer distal angle is not produced into a distinct tubercle.

Lip and *Sternum.* Essentially as in male.

Legs. 4132. Tibial index of first leg 21, of fourth leg 16.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.02	.58	.64	.53	.38	3.15
2.	.80	.45	.45	.41	.35	2.46
3.	.83	.39	.45	.51	.35	2.53
4.	1.08	.51	.70	.64	.38	3.31

Spines. First leg: as in male. Second leg: as in male except metatarsus prolateral 0–1, ventral 2–1r. Third leg: femur dorsal 0–1–1–1, prolateral distal 1; elsewhere as in male. Fourth leg: femur only dorsal 0–1–1–1; elsewhere as in male.

Abdomen. Essentially as in male.

Epigynum. Posterior border very convex; without visible external posterior marginal notch; some indication of a recess in middle of pos-

terior border; main part of plate bordered anteriorly by a fine line; centrally with two curved lines divergent posteriorly (Fig. 250).

Color in alcohol. Carapace: generally a reddish mahogany brown with white lanceolate hair probably distributed all over dorsal and lateral surfaces in life; with many greenish iridescent scales. Mouth parts essentially as in male. First pair of legs brownish except tarsi which are much lighter. Palps and other legs yellowish white spotted with reddish brown. Abdomen: with many glittering, greenish golden scales; dorsum generally reddish brown with a paired series of lighter spots extending through the center with a series of darker reddish brown spots lateral to the lighter ones; also many small reddish brown and yellowish spots; a narrow white basal band, short lateral stripes, and spots essentially as in male; elsewhere as in male except these regions are lighter colored than in that sex.

Type locality. Male holotype and female allotype together with four paratypes of each sex from Boquete, R. P., July, 1939.

Metaphidippus fastosus spec. nov.

Figures 251–254

Male holotype. Total length 2.94 mm. Carapace 1.60 mm. long, 1.18 mm. wide slightly behind PLE which occupy twenty-five twenty-sixths of width of carapace at their level, .90 mm. tall and, therefore, almost three quarters as tall as wide; steep posterior declivity begins five elevenths of distance from posterior border of PLE to posterior border of carapace; a short and somewhat sinuous longitudinal thoracic groove lies just before beginning of steep declivity; surface finely granulate, especially in interocular area.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME just misses dorsal borders of ALE. Posterior row wider than anterior row in ratio of 25 : 23, wider than middle row in ratio of 50 : 43. Quadrangle of laterals wider than long in ratio of 25 : 16. Total eye space occupies thirty-seven seventieths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 15 : 8 : 2 : 7.5. AME barely separated from one another and from ALE. Middle eyes equidistant from ALE and PLE. Height of clypeus equal to one tenth of diameter of AME. Clypeus decorated only by a ventral row of bristles and a few stiff bristles elsewhere, a very few scattered white lanceolate hairs beneath ALE and up to AME.

Chelicerae. Slightly porrect, slightly divergent, moderately produced; basal segment .60 mm. long; broadly ridged in front from near

inner proximal angle to outer distal angle. Fang long, slender and sinuous, attenuate distally. Fang groove considerably excavated; with two small promarginal teeth near medial end; a single long curved retromarginal tooth near middle; also a short robust tooth at base of fang on prolateral side of basal segment (Fig. 251).

Maxillae. Parallel; longer than wide in middle in ratio of about 2 : 1; acutely notched in middle of outer border; outer distal angle sharp but with no definite hook or tubercle; palp inserted into basal two fifths.

Lip. As wide as long; basal excavations reach about one third length of organ; reaches just short of middle of maxillae; sternal suture gently procurved.

Sternum. Elongate scutiform; longer than wide in ratio of 16 : 11; widest between second coxae; anterior border as wide as base of lip; posterior end rounded and not extended between fourth coxae which are separated by one fourth their diameter.

Legs. 1423. Tibial index of first leg 16, of fourth leg 11.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.09	.57	.81	.52	.35	3.34
2.	.75	.45	.55	.48	.28	2.51
3.	.77	.26	.55	.58	.30	2.46
4.	1.08	.45	.70	.64	.38	3.25
Palp	.70	.20	.13	—	.38	1.41

Spines. First leg: femur dorsal 0–1–1–1, prolateral distal 1; patella only prolateral 0–1–0; tibia only ventral 2–2–2, fairly well matched with promarginal series occupying distal two thirds of segment and retromarginal series somewhat more than this; metatarsus only ventral 0–2–2. Second leg: femur as in first; patella 0; tibia only ventral 1r–1r–2; metatarsus only prolateral 0–1, ventral 1r–1r. Third leg: femur as in first; patella 0; tibia prolateral and retrolateral 0–0–1, ventral 0–0–1p; metatarsus prolateral 0–2, retrolateral 0–1, ventral 0–1p. Fourth leg: femur as in first; patella 0; tibia only retrolateral 0–1–0, ventral 1p–0–2; metatarsus as in third.

Palp. Patella and tibia both short with the latter about two thirds as long as former; tibial retrolateral apophysis a simple spur directed toward distal end of tarsus; tarsus small, bulb moderately swollen, bilobed; from anterior border of small rugulose lobe on retrolateral side arises the embolus as a moderately slender spine, regularly curved prolaterally (Figs. 252–253).

Abdomen. Ovoid; longer than wide in ratio of 24 : 15; anal tubercle and spinnerets as usual in the genus; position of colulus undetermined; tracheal spiracle near base of spinnerets.

Color in alcohol. Carapace: nearly uniformly dark mahogany brown with eyes on black spots and white lanceolate hairs rather sparsely distributed over surface; considerable iridescence due to granulated surface and iridescent greenish scales. All mouth parts dark brown with yellowish tips. Legs: all femora dark brown; first leg with all segments distal to femora brownish with distal ends of tarsi yellowish; second and third tarsi entirely yellowish; third leg with a ventral light stripe from patella to metatarsus; second leg similar but less well marked; all segments of fourth leg distal to femora dark brown; all legs with more or less white appressed lanceolate hair. Abdomen: dorsum with bright mahogany brown color with many iridescent coppery and purplish scales; laterally with narrow alternating light and dark brown stripes; venter brown bordered on each side by a row of obscure yellowish dots.

Female allotype. Total length 3.26 mm. Carapace 1.34 mm. long, .90 mm. wide at level of PLE which occupy the full width of carapace, .60 mm. tall and, therefore, two thirds as tall as wide. Otherwise essentially as in male.

Eyes. Seen from in front, anterior row recurved as in male. Quadrangle of laterals wider than long in ratio of 21 : 13. Total eye space occupies slightly less than one half the length of carapace. Ratio of eyes AME : ALE : PME : PLE = 13 : 7 : 1.5 : 6. Height of clypeus equal to one twelfth of the diameter of AME. Otherwise essentially as in male.

Chelicerae. Vertical, parallel; of moderate size; basal segment .32 mm. long. Fang moderately robust, evenly curved. Fang groove with two small promarginal teeth and a single robust retromarginal tooth which, from certain angles, resembles somewhat a fissidentate tooth.

Maxillae, Lip, and *Sternum.* Essentially as in male.

Legs. 4132. Tibial index of first leg 18, of fourth leg 16.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.65	.30	.43	.32	.28	1.98
2.	.52	.26	.35	.30	.17	1.69
3.	.58	.28	.33	.38	.26	1.83
4.	.77	.35	.46	.50	.32	2.40

Spines. First leg: as in male except patella 0. Second leg: femur and patella as in male; tibia only ventral 1r–1r–0; metatarsus only ventral 1r–2. Third leg: femur and patella as in male; tibia only prolateral 0–1–0; metatarsus 0. Fourth leg: femur and patella as in male; tibia only ventral 1p–0–2; metatarsus only prolateral 0–2, ventral 0–1.

Abdomen. Ovoid; longer than wide in ratio of about 3 : 2, widest about three fifths from base. Otherwise essentially as in male.

Epigynum. A very simple epigynal plate with a small posterior marginal notch; two curved tubes within, just anterior to marginal notch; a pair of simple curved lines like so many other females of the genus, probably guarding minute openings (Fig. 254).

Color in alcohol. Carapace: brownish, duller than in male; lanceolate white hairs well distributed and also concentrated to make an indistinct narrow stripe just below PLE and extended back to about opposite the beginning of posterior declivity; a fairly well defined narrow marginal white stripe from opposite PLE to posterolateral angle. Palps brownish with distal halves of tarsi yellowish. Legs: all femora dark brown; posterior tarsi dark brown, all others yellowish, other segments yellowish but striped and somewhat spotted with reddish brown. Abdomen: generally brownish gray; a narrow white basal band continues laterally for about one third of length of abdomen (absent in some paratypes); a short distance behind middle is a pair of large, nearly black, dorsal spots; many iridescent scales everywhere except on venter which is light brown and bordered with rows of yellowish dots.

Type locality. Male holotype and female allotype from Canal Zone Forest Reserve, C. Z. Aug., 1939. Male and female paratypes from the following localities: Canal Zone Biological Area, Aug., 1934; Aug., 1939; Canal Zone Forest Reserve, C. Z., July–Aug., 1939; Porto Bello, R. P., Aug., 1936; El Valle, R. P., July, 1936.

Metaphidippus iridescens F. Cambridge, 1901

M. iridescens Petrunkevitch, 1911
M. iridescens Petrunkevitch, 1925

This is another species known only from females. Apparently it has not been recognized since Cambridge's time, and it has not yet appeared in my collection.

Metaphidippus laetabilis (Peckham), 1896

Figures 255–257

Dendryphantes laetabilis Peckham, 1896
M. laetabilis F. Cambridge, 1901
D. laetabilis Petrunkevitch, 1911
D. laetabilis Petrunkevitch, 1925
D. laetabilis Banks, 1929

The Peckhams had a single male from Panama sent to them by Count Keyserling. Banks had three males from the Canal Zone. I have already pointed out the likelihood that *M. cupreus* F. Cambridge is the female of this species.

Male hypotype. Total length (not including porrect chelicerae) 6.14 mm. Carapace 2.84 mm. long, 2.22 mm. wide, 1.41 mm. tall and, therefore, nearly two thirds as tall as wide; surface finely granulated, especially the interocular area; with few hairs except the lanceolate appressed white hairs to be noted later; long bristles in eye region, especially below ALE and PME; a short median longitudinal thoracic groove in a shallow depression just behind level of PLE.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one seventh of the diameter of ALE. Anterior row and posterior row almost equally wide. Quadrangle of laterals wider than long in ratio of 26 : 17. Total eye space occupies twenty forty-thirds of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 24 : 12.5 : 3 : 11. AME separated from one another by about one sixteenth of their diameter, from ALE by one eighth of their diameter. Middle eyes closer to ALE than to PLE in ratio of 7 : 9. Height of clypeus equal to one eighth of the diameter of AME. Clypeus undecorated except by six long stiff bristles in a transverse row and the usual three in lower angle between AME.

Chelicerae. Porrect, divergent distally, strongly produced; with basal segment 1.30 mm. long. Fang long and very sinuous; with a robust tooth on its inner side near base of fang. Fang groove also sinuous and rugulose; with two promarginal teeth, a small one near medial end and a very long, robust tooth about two thirds of length of groove from base of fang; also a blunt robust tooth on prolateral side of basal segment close to base of fang; a single robust pointed retromarginal tooth about one third of length of groove from base of fang (Fig. 255).

Maxillae. Parallel; longer than wide in middle in ratio of about 3 : 1; quite concave along outer border; outer distal angle with a sharp point but not a definite tooth or hook.

Lip. Longer than wide in ratio of about 3 : 2; basal excavations obscure but probably reach about two fifths of length of organ; reaches to about middle of maxillae. Sternal suture somewhat procurved.

Sternum. Quite convex in posterior three fifths; elongate scutiform; longer than wide in ratio of 56 : 37; widest between second coxae; covered with light colored slender bristles; anterior end just a little narrower than base of lip; posterior end blunt and not extended between fourth coxae which are separated by one fifth of their diamaeter.

Legs. 1423. Tibial index of first leg 14, of fourth leg 15.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.44	1.60	2.24	1.92	.96	9.16
2.	1.47	.83	.98	.93	.58	4.79
3.	1.53	.77	.83	1.02	.51	4.66
4.	1.85	.90	1.28	1.26	.58	5.87
Palp	1.08	.41	.36	—	.62	2.47

A sparse supply of long light colored hair, especially on first leg, which may be more conspicuous on ventral surface, but without definite fringes.

Spines. First leg: femur only dorsal 0–0–1–1–1, prolateral 0–0–0–1–2; patella only prolateral 0–1–0; tibia only ventral 2–2–2, promarginal series occupying slightly more than three fifths of segment, retromarginal series extending over somewhat greater distance; metatarsus only ventral 0–2–2. Second leg: femur only dorsal 0–1–1–1, prolateral distal 1; patella 0; tibia only ventral 0–1r–0–2; metatarsus only ventral 0–2–2. Third leg: femur and patella as in second; tibia only ventral 0–0–2; metatarsus prolateral and retrolateral 0–1, ventral 0–2. Fourth leg: femur dorsal 0–1–1–1, prolateral and retrolateral 0–0–0–1; patella 0; tibia only ventral 1p–0–1p; retrolateral 0–1–1–0; metatarsus prolateral and retrolateral 0–1, ventral 0–2. Palpal spines: only femur dorsal 0–1–1.

Palp. Femur somewhat curved dorsoventrally; both patella and tibia short; retrolateral tibial apophysis a simple pointed spur directed distally; tarsus relatively small, with embolus arising near distal end from retrolateral side and curving distally and prolaterally (Figs. 256–257).

Abdomen. Elongate ovoid, longer than wide in ratio of 29 : 14, widest about two fifths from base but not much wider than at base; a pair of dorsal sigilla about in middle; dorsal area strongly chitinized so that dorsal shield is almost present; anal tubercle a short cone with

a tuft of white hairs; spinnerets as usual in the genus; tracheal spiracle near base of spinnerets, without a tubercle.

Color in alcohol. Carapace: generally a deep rich mahogany reddish brown; white lanceolate hairs form two pairs of spots, one between PME and PLE, the other behind PLE. Probably many white hairs present in life have been rubbed off but there is an incomplete narrow white marginal stripe made by lanceolate hairs still remaining. Sternum and chelicerae dark reddish brown. Lip and maxillae the same with yellowish tips and black streaks. First pair of legs nearly all reddish brown including the coxae, with just the distal end of tarsi yellowish. Other legs lighter with coxae, trochanters, and proximal halves of femora yellowish white; light ventral stripes on tibiae and metatarsi; tarsi generally yellowish with reddish brown spots. Abdomen: dorsal area a rich glossy mahogany brown completely surrounded by a narrow white band; at base laterally and ventrally abdomen is brown, striped narrowly along lateral sides with yellowish color and bearing rows of yellowish dots ventrally; spinnerets bright reddish brown. The dorsal surface of the abdomen and, to some extent also, the carapace somewhat iridescent due to the presence of many small scales.

Type locality. Male hypotype and two other males from Canal Zone Biological Area, June–July, 1934; one male from the same locality, June, 1936.

Metaphidippus lanceolatus F. Cambridge, 1901

Dendryphantes lanceolatus Banks, 1909
D. lanceolatus Petrunkevitch, 1911
D. lanceolatus Petrunkevitch, 1925

One male from Boquete, R. P., July, 1939. The female is still unknown.

Metaphidippus laetificus spec. nov.

Figures 258–263

This species may be somewhat closely related to *M. apicalis* F. Cambridge from Mexico. In the latter species the ventral tibial spines are crowded into the distal third of the segment. In this new species the spines are not only crowded distally but they are also reduced in number. A question regarding the proper placement of the species may well be raised, but I know of no better place for it in the system.

Male holotype. Total length 3.58 mm. Carapace 1.75 mm. long,

1.26 mm. wide at level of PLE which occupy a little more than full width of the carapace because this part of body is somewhat constricted dorsally, but they occupy twenty-seven twenty-ninths of the full ventral width; .96 mm. tall and, therefore, .76 as tall as wide; gently arched from AME to posterior steep declivity which begins about three sevenths of the distance from PLE to posterior border (Fig. 258); a very short median longitudinal thoracic groove just before the steep posterior declivity begins; whole carapace strongly chitinized and conspicuously granulated on surface, especially in interocular area.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME miss the dorsal borders of ALE by about one ninth the diameter of the latter. Posterior row slightly wider than anterior row, wider than middle row in ratio of 53 : 45. Quadrangle of laterals wider than long in ratio of 53 : 40. Total eye space occupies four sevenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 19 : 9 : 2.5 : 9. AME separated from one another by one twentieth of their diameter, contiguous to ALE. Middle eyes much closer to ALE than to PLE in ratio of 2 : 3. Height of clypeus equal to one fifth of the diameter of AME. Clypeus decorated only by a row of long bristles convergent toward middle line, transparent iridescent scales, and the usual three bristles in lower angle between AME.

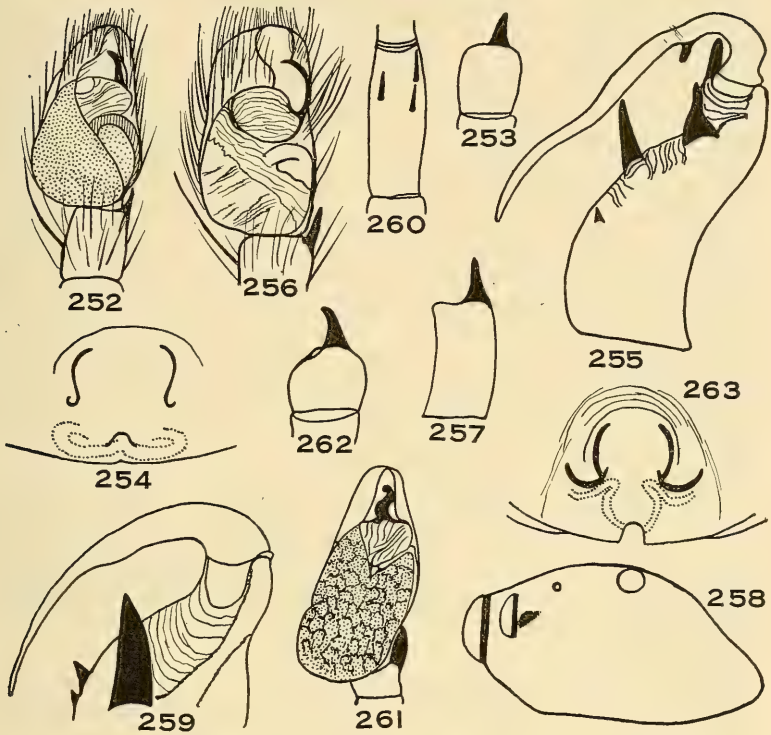
Chelicerae. Slightly porrect, mildly divergent, moderately produced; with basal segment .58 mm. long. Fang rather long, somewhat sinuous, suddenly attenuated near middle. Fang groove deeply excavated; promargin with the usual two small teeth; retromargin with a single simple robust blade-like tooth rather close to the small promarginal teeth (Fig. 259).

Maxillae. Parallel; longer than wide in middle in ratio of about 5 : 2; rather deeply notched in middle of outer border; whole outer distal corner drawn out into a broad tubercle.

Lip. Only slightly longer than wide at base; basal excavations obscure but appear to reach about one third of length of organ. Sternal suture gently procurved.

Sternum. Elongate scutiform; longer than wide in ratio of 33 : 23; widest between second coxae; anterior border not quite as wide as lip at base; posterior end bluntly rounded and not extended between fourth coxae which are separated by one fifth of their diameter.

Legs. 1423. Tibial index of first leg 17, of fourth leg 14.



External Anatomy of Spiders

Figs. 252–253. *Metaphidippus fastosus* Chickering; male palp, ventral view; and palpal tibia, retrolateral view.
Fig. 254. *M. fastosus* Chickering; epigynum, ventral view.
Fig. 255. *M. laetabilis*, male chelicera.
Figs. 256–257. *M. laetabilis*, male palp, ventral view; and palpal tibia, retrolateral view.
Fig. 258. *M. laetificus* Chickering; male carapace, lateral view.
Fig. 259. *M. laetificus* Chickering; male chelicera.
Fig. 260. *M. laetificus* Chickering; first tibia, ventral view.
Figs. 261–262. *M. laetificus* Chickering; male palp, ventral view; and palpal tibia, retrolateral view.
Fig. 263. *M. laetificus* Chickering; epigynum, ventral view.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.09	.70	.81	.65	.38	3.63
2.	.90	.44	.52	.46	.37	2.69
3.	.81	.38	.45	.49	.38	2.51
4.	.98	.45	.72	.67	.38	3.20
Palp	.60	.24	.12	—	.63	1.59

All legs with a moderate supply of dark hair, white lanceolate hair but no fringes. First leg with a few transparent iridescent scales and considerably the stoutest.

Spines. First leg: femur dorsal 0–1–1–1, prolateral distal 1; patella 0; tibia only ventral 0–2–1p (Fig. 260); metatarsus only ventral 2–2. Second leg: femur and patella as in first; tibia only ventral 0–0–1p; metatarsus only ventral 1r–2. Third leg: femur and patella as in first; tibia 0; metatarsus only prolateral 0–1. Fourth leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 1 on right, only dorsal as given on left; patella 0; tibia 0; metatarsus only prolateral 0–1. Palpal spines 0.

Palp. Femur only slightly curved dorsoventrally; patella and tibia both short, the latter only half as long as former; tibial retrolateral apophysis a simple, fairly robust spur directed distally; tarsus with much swollen bulb which largely overlaps the tibia, tarsal spine (probably the embolus) fairly robust and spiraloid with tip bent ventrally (Figs. 261–262).

Abdomen. Ovoid, broadly rounded at apex as at base; longer than wide in ratio of 30 : 17, widest just before the middle; anal tubercle a short whitish cone, reddish brown at base, with a tuft of whitish hairs; spinnerets as usual in the genus; position of colulus not indicated; tracheal spiracle near base of spinnerets, without a tubercle.

Color in alcohol. Very bright reddish brown with appearance of having been varnished; very shiny and waxy. Carapace: almost entirely bright reddish brown with eyes on black spots; many fine black intercommunicating lines; white lanceolate hairs generally distributed and suggesting two short stripes along posterolateral angles though these may be due to differential rubbing of the white hairs; also many transparent iridescent coppery green scales, especially in ocular region. Sternum plain reddish brown. Mouth parts plain reddish brown with whitish tips on maxillae and lip. Palps streaked with reddish brown and yellowish white with many white lanceolate hairs. First pair of legs dark reddish brown with tarsi somewhat lighter; other legs yellowish white, spotted with reddish brown. Abdomen: central dorsal

area heavily chitinized and bright reddish brown enclosing eight small light colored spots arranged in two rows diverging posteriorly; a poorly defined white basal band which continues dorsolaterally to bound the central area in an incomplete narrow stripe nearly to spinnerets; lateral sides with many alternate yellowish and brownish narrow stripes; dorsal and lateral sides well supplied with highly iridescent transparent scales like those on carapace but often giving a bright golden sheen to these parts; venter reddish brown throughout with a long row of yellowish spots on each side near margin.

Female allotype. In general strikingly like the male. Total length 3.71 mm. Carapace 1.73 mm. long, 1.21 mm. wide at level of PLE, .90 mm. tall and, therefore, almost three fourths as tall as wide. Other features as in male.

Eyes. Seen from in front, anterior row recurved as in male. Quadrangle of laterals wider than long in ratio of 27 : 14. Total eye space occupies twenty-two thirty-ninths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 17 : 8 : 2 : 8. AME barely separated from one another and from ALE. Height of clypeus equal to one fourth of diameter of AME. Clypeus decorated by many white lanceolate hairs and a few bristles which protrude between the hairs. Other features essentially as in male.

Chelicerae. Parallel, vertical; basal segment .50 mm. long; with numerous white lanceolate hairs over basal half; essentially as in male except for the secondary sexual characters in that sex. Fang of moderate size, evenly curved. Fang groove with two small promarginal teeth as usual in the genus and a single simple retromarginal tooth of moderate size.

Maxillae, Lip, and *Sternum.* All essentially as in male except the maxillae are not as deeply notched in middle of outer border and they are without a tuberculate extension of the outer distal angles.

Legs. 4123. Tibial index of first leg 23, of fourth leg 16.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.90	.54	.58	.45	.35	2.82
2.	.75	.38	.50	.40	.32	2.35
3.	.66	.38	.45	.45	.36	2.30
4.	.96	.45	.69	.64	.38	3.12

Spines. First leg: as in male. Second leg: femur only dorsal 0–1–1–1 on left, 0–1–0–1 on right; patella 0; tibia 0; metatarsus as in male. Third leg: femur dorsal 0–1–0–1 on right, 0–0–0–1 on left; elsewhere 0.

Fourth leg: only femur dorsal 1–0–1; metatarsus prolateral 0–1; elsewhere 0.

Abdomen. Essentially as in male.

Epigynum. Epigynal plate about as long as wide; quite deeply notched in middle of posterior margin; near middle is a pair of openings a little more than a diameter of one of them apart; the median anterior part of plate is a shallow depression (Fig. 263).

Color in alcohol. In general strikingly like that of male. First tarsi and metatarsi all yellowish white. Abdominal dorsal light spots larger and more definite in outline. Scales also more conspicuous on abdomen than in male.

Type locality. Male holotype and female allotype from El Valle, R. P., July, 1936.

Metaphidippus latus spec. nov.

Figures 264–267

This species and the one immediately following appear to blend many of the characters of Metaphidippus and Parnaenus, but they are here considered to be closer to the former genus.

Male holotype. Total length 3.58 mm. Carapace 1.86 mm. long, 1.55 mm. wide at level of PLE which occupy nearly six sevenths of the width of the carapace at their level; .96 mm. tall and, therefore, about .62 as tall as wide; surface finely granulate, especially in interocular region; a moderate supply of hair and bristles, especially around eyes; a short median longitudinal thoracic groove about halfway from posterior border of PLE to beginning of steep posterior declivity which begins about two thirds of the distance from posterior border of PLE to posterior border of carapace; broadly convex along lateral sides from ALE to considerably behind PLE (Fig. 264).

Eyes. Seen from in front, anterior row recurved so that dorsal borders of AME are level with those of ALE. Posterior row wider than anterior row in ratio of 21 : 19, wider than middle row in ratio of 21 : 17. Quadrangle of laterals wider than long in ratio of 21 : 11. Total eye space occupies thirteen twenty-ninths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 16.5 : 9 : 2 : 8. AME separated from one another by one fifteenth of their diameter, from ALE by twice that distance. Middle eyes closer to ALE than to PLE in ratio of 8 : 11. Height of clypeus equal to one fifth of the diameter of AME. Clypeus decorated only by numerous stiff bristles.

Chelicerae. Porrect, considerably produced, quite divergent from near bases; basal segment .78 mm. long. Fang long, slender, sinuous and attenuate distally. Fang groove with two slender pointed promarginal teeth near medial end; a single, fairly robust, long, curved, retromarginal tooth only a short distance from base of fang; hardly a tooth, but rather a blunt tubercle on prolateral side of basal segment at base of fang (Fig. 265).

Maxillae. Parallel; longer than wide in middle in ratio of about 12 : 5 (largely hidden by first coxae); quite deeply notched in middle of outer border; outer distal angle considerably produced.

Lip. Longer than wide in ratio of 13 : 12; basal excavations reach only a little more than one third of length of organ; reaches to middle of maxillae. Sternal suture somewhat sinuous, but to be regarded as essentially straight.

Sternum. Moderately convex in posterior two thirds; elongate scutiform; longer than wide in ratio of 35 : 23; widest between second coxae; anterior border as wide as base of lip; posterior end bluntly rounded and not extended between fourth coxae which are separated by one sixth of their width.

Legs. 1423. Tibial index of first leg 20, of fourth leg 16.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.20	.70	.96	.68	.38	3.92
2.	.96	.45	.58	.54	.32	2.85
3.	.90	.40	.51	.64	.35	2.80
4.	1.03	.52	.70	.64	.38	3.27
Palp	.64	.25	.13	—	.56	1.58

Legs with a moderate supply of both long light hair and appressed white lanceolate hair, but with no definite fringes unless the slightly increased amount of hair on the first pair of legs is regarded as the vestige of a ventral fringe. First legs considerably the stoutest.

Spines. First leg: femur dorsal 0–1–1–1, prolateral distal 2; patella only prolateral 0–1–0; tibia only ventral 2–2–2, with promarginal series occupying distal five eighths of segment, retromarginal series occupying about eight elevenths of segment; metatarsus only ventral 0–2–2. Second leg: femur and patella as in first; tibia only prolateral 0–1–1–0; ventral 1r–1r–2; metatarsus only prolateral 1–1, ventral 2–2. Third leg: femur as in first except retrolateral distal 1; patella only retrolateral 0–1–0; tibia prolateral and retrolateral 0–1–1–0, ventral 0–0–2; metatarsus prolateral and retrolateral 1–2, ventral 0–2. Fourth

leg: femur and patella as in third except femur prolateral only distal 1; tibia prolateral 0–1–0, retrolateral 0–1–1–0, ventral 1p–0–2; metatarsus prolateral 1–2, retrolateral 1–1, ventral 0–1r. Palpal spines: only femur dorsal 0–1–1.

Palp. Femur considerably curved dorsoventrally; patella and tibia both short, the latter about half as long as former; tarsus of moderate size, bulb moderately swollen, with a short slender spine from anterior border of the small distal lobe; cymbium with a conspicuous dorsal basal lobe or tubercle; tibial retrolateral apophysis stout, long, and conspicuously geniculate nearly in the middle (Figs. 266–267).

Abdomen. Ovoid, longer than wide in ratio of 30 : 17; widest near middle; anal tubercle a short cone with a tuft of stiff yellowish white hairs; spinnerets as usual in the genus; position of colulus indicated by a small tuft of stiff hairs; tracheal spiracle near base of spinnerets, without a tubercle.

Color in alcohol. Carapace: generally and fairly uniformly a rich mahogany brown streaked with black lines; eyes on black spots; iridescent scales numerous, especially around eyes; a small whitish spot near each posterolateral angle (probably much more extensive in life) made by lanceolate hairs. Sternum medium brown. Chelicerae dark rich brown; other mouth parts lighter brown with yellowish tips. Legs: first pair darkest, femora very dark brown, tarsi yellowish white, other segments lighter brown; other legs similar to first but lighter in color; all legs with scattered white lanceolate hairs. Abdomen: whole central area covered by a broad, central, rich, mahogany brown stripe including two pairs of sigilla and two pairs of small white marks in posterior third; a narrow white basal band extends dorsolaterally two thirds the length of the abdomen; lateral regions with alternate brown and yellowish narrow stripes; iridescent scales over all parts except the venter which is dark brown bordered on each side by an obscure row of small yellowish dots.

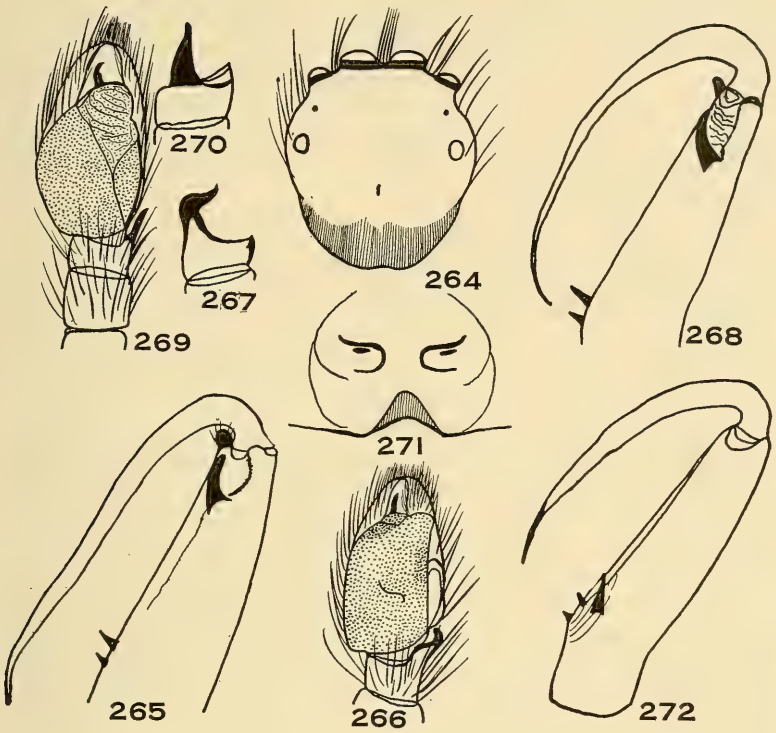
Type locality. Male holotype from El Valle, R. P., July, 1936. No paratypes.

Metaphidippus laxus spec. nov.

Figures 268–271

This species appears to be very closely related to *M. latus* sp. nov. The differences are most evident in the male palp and in color.

Male holotype. Total length 3.78 mm. Carapace 1.79 mm. long, 1.60 mm. wide at level of PLE which occupy twenty-one twenty-fifths



External Anatomy of Spiders

Fig. 264. *Metaphidippus latus* Chickering; male carapace, dorsal view.
Fig. 265. *M. latus* Chickering; male chelicera.
Figs. 266–267. *M. latus* Chickering; male palp, ventral view; and palpal tibia, retrolateral view.
Fig. 268. *M. laxus* Chickering; male chelicera.
Figs. 269–270. *M. laxus* Chickering; male palp, ventral view; and palpal tibia, retrolateral view.
Fig. 271. *M. laxus* Chickering; epigynum, ventral view.
Fig. 272. *M. perscitus* Chickering; male chelicera.

of the width of the carapace at that level, 1.10 mm. tall and, therefore, about .69 as tall as wide; surface finely granulate, especially in the interocular area; with many short stiff bristles in region of eyes and a moderate supply of dark simple hair; well rounded laterally from below PME to steep posterior declivity which begins about three fifths of distance from PLE to posterior border; with a short median longitudinal thoracic groove about half-way from PLE to beginning of steep posterior declivity.

Eyes. Anterior row recurved so that dorsal borders of AME are slightly above those of ALE. Posterior row wider than anterior row in ratio of 31 : 27, wider than middle row in ratio of 31 : 26. Quadrangle of laterals wider than long in ratio of 62 : 35. Total eye space occupies twenty-one fortieths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 17 : 9 : 2 : 8. AME separated from one another by one eighth of their diameter, from ALE by one sixth of their diameter. Middle eyes closer to ALE than to PLE in ratio of about 10 : 11. Height of clypeus equal to one fourth the diameter of AME. Clypeus decorated by numerous dark lanceolate hairs which converge toward middle line and are quite iridescent in certain light, a few long and apparently irregularly placed black bristles, and the usual three long brownish bristles in lower angle between AME.

Chelicerae. Strongly produced; rather slender; porrect, divergent from bases; basal segment 1.09 mm. long. Fang slender, long, sharply bent near base, mildly sinuous, attenuated distally and bent sharply downward near tip. Fang groove with two sharply pointed small teeth near medial end on promargin; a blunt tubercle near base of fang on prolateral side of basal segment; retromargin with a single simple large tooth about one fourth from base of fang and curved toward it (Fig. 268).

Maxillae. Parallel; longer than wide in middle in ratio of about 2 : 1; fairly deeply notched in middle of outer border; palp inserted into basal two fifths; outer distal corner quite angular but without hook or tubercle.

Lip. Slightly wider at base than long; basal excavations not clearly seen. Sternal suture straight.

Sternum. Elongate scutiform; longer than wide in ratio of 17 : 11; widest between second coxae; anterior border somewhat narrower than base of lip; convex from anterior border with peak of convexity between intervals separating second and third coxae; posterior end rounded and not extended between fourth coxae which are separated by nearly one fourth of their diameter. Anterior coxae somewhat the stoutest but only slightly stouter than second.

Legs. 1423. Tibial index of first leg 19, of fourth leg 17.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.28	.70	1.14	.77	.46	4.35
2.	1.02	.45	.65	.59	.38	3.09
3.	1.02	.48	.58	.59	.37	3.04
4.	1.15	.57	.71	.65	.40	3.48
Palp	.65	.21	.14	—	.51	1.51

All legs with a moderate supply of white lanceolate hair and short, light colored simple hair. First pair of legs with what might be considered the vestiges of a ventral fringe of light colored hair from femora to tarsi.

Spines. First leg: femur dorsal 0–1–1–1, prolateral only distal 2; patella only prolateral 0–1–0; tibia only ventral 2–2–2, with promarginal series occupying about the distal half of segment, retromarginal series about the distal two thirds; metatarsus only ventral 0–2–2. Second leg: femur as in first except retrolateral distal 1; patella 0; tibia prolateral 0–1–1–0, ventral 1r–1r–2; metatarsus prolateral 0–1, ventral 0–2–2. Third leg: femur as in second; patella only retrolateral 0–1–0; tibia prolateral and retrolateral 0–1–1–0, ventral 0–0–2; metatarsus prolateral and retrolateral 1–2, ventral 0–2. Fourth leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 1; patella as in third; tibia only retrolateral 0–1–1–0, ventral 1p–0–2; metatarsus prolateral 0–1, retrolateral 0–2, ventral 0–2. Palpal spines: only femur dorsal 0–1–1–1–1.

Palp. Femur moderately bent dorsoventrally; with four dorsal spines; both patella and tibia short, the latter about two thirds as long as the former; tibial retrolateral apophysis a stout spur directed forward; bulb moderately swollen, much longer than broad; embolus a moderately stout short spine gently curved retrolaterally (Figs. 269–270).

Abdomen. Ovoid, longer than wide in ratio of about 3 : 2, widest about two fifths of its length from base; anal tubercle a short flattened cone with a tuft of whitish hairs; spinnerets as usual in the genus; position of colulus indicated by a small tuft of stiff black hairs; tracheal spiracle near base of spinnerets, with a lip but with no tubercle.

Color in alcohol. In general a somber colored species. Carapace: generally very dark brown; eyes on black spots and interocular area nearly black; lateral sides and steep posterior declivity lighter but with very dark brown streaks; little iridescence except on clypeus as already

noted. Legs: all femora dark brown with faint dorsal lighter stripes; all patellae light brown streaked with dark brown; first tibiae reddish brown, others lighter and streaked with reddish brown; first metatarsi reddish brown, second and third yellowish white, fourth yellowish white in middle with reddish brown ends; all tarsi yellowish white. Chelicerae: rich dark brown with highly polished surface, more or less streaked with light brown. Palps dark brown. Sternum dark brown; lips and maxillae the same with yellowish white tips. Abdomen: dorsal area brownish, with many golden iridescent scales and four pairs of large dark spots obscurely outlined by incomplete light marks bearing a few white lanceolate hairs; a narrow whitish basal band continues dorsolaterally for nearly half the length of the abdomen; remainder of base and lateral sides dark brown, more or less spotted with small yellowish dots; venter very dark brown with a border of yellowish dots on each side.

Female allotype. Total length 5.00 mm. Carapace 1.98 mm. long, 1.54 mm. wide at level of PLE which occupy thirty-two thirty-fifths of the width of the carapace, .90 mm. tall and, therefore, .58 as tall as wide; less rounded laterally than in male. Otherwise essentially as in male.

Eyes. Seen from in front, anterior row recurved as in male. Posterior row wider than anterior row in ratio of 65 : 58, wider than middle row in ratio of 65 : 56. Quadrangle of laterals wider than long in ratio of 65 : 36. Total eye space occupies slightly less than one half the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 17 : 9 : 2.5 : 8. AME separated from one another by one tenth of their diameter, from ALE by one sixth of their diameter. Middle eyes closer to ALE than to PLE in ratio of 11 : 12. Height of clypeus equal to about one fourth of the diameter of AME. Clypeus decorated with a thick coat of long lanceolate white hairs converging toward middle line, a few long white bristles which protrude through the white hair, and the usual three bristles in lower angle between AME (these three bristles are brownish in their distal third, whitish elsewhere).

Chelicerae. Vertical, parallel; moderately robust; somewhat swollen in front obliquely from above near medial border toward outer distal corner; slightly excavated in front in middle of medial border; basal segment about .64 mm. long; basal third with many short white lanceolate hairs and considerably overlapped by the white hairs from the clypeus. Fang short, fairly evenly curved. Fang groove with two promarginal teeth and a single retromarginal tooth as usual in the genus.

Maxillae, Lip, and *Sternum.* Essentially as in male.

Legs. 1423. Tibial index of first leg 22, of fourth leg 16.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.02	.70	.76	.64	.34	3.46
2.	.96	.51	.58	.51	.30	2.86
3.	.96	.51	.51	.51	.34	2.83
4.	1.08	.58	.70	..69	.34	3.39

All vestiges of the ventral fringe poorly developed in the male seem to have disappeared in the female.

Spines. First leg: essentially as in male. Second leg: femur as in male; patella only prolateral 0–1–0; tibia prolateral 0–0–1–0, ventral 1r–1r–2; metatarsus prolateral 0–1, ventral 2–1r. Third leg: femur dorsal 0–0–1–1–1, prolateral and retrolateral distal 1; patella only retrolateral 0–1–0; tibia prolateral 0–1–0; retrolateral 0–1–1–0, ventral 0–0–2; metatarsus prolateral and retrolateral 1–2, ventral 0–2. Fourth leg: femur and patella as in third; tibia prolateral 0–1–0, retrolateral 0–1–1–0, ventral 1p–0–2; metatarsus prolateral 1–1, retrolateral 0–1, ventral 0–2. Palpal spines: only femur dorsal 0–0–1–1–1.

Abdomen. Essentially as in male.

Epigynum. With a deep posterior marginal notch and probably a dorsal recess; about the middle of the plate appear two narrowed depressions separated by the length of one of them, each appearing to open inward (Fig. 271).

Color in alcohol. Carapace: in a general way, with exception of the clypeus, much as in male; many white lanceolate hairs generally distributed thus giving the dark color a grayish appearance. Legs: much as in male except generally lighter. Chelicerae light reddish brown. Otherwise essentially as in male.

Type locality. Male holotype and female allotype with several paratypes of both sexes from Boquete, R. P., July, 1939.

Metaphidippus longipalpus F. Cambridge, 1901

Dendryphantes longipalpus Petrunkevitch, 1911
D. longipalpus Petrunkevitch, 1925
D. longipalpus Banks, 1929

Mr. Banks ('29) had a male from the Canal Zone Biological Area, June, 1924. I have two males from the same locality, Aug. and Sept. (Zetek), 1939. There are certain differences between these three

specimens from the Canal Zone Biological Area and Cambridge's description of males from Bugaba, R. P., but I think best to regard them as belonging to one species for the present. Careful descriptions should be drawn up at the earliest opportunity. The female is not known.

Metaphidippus momus F. Cambridge, 1901

Dendryphantes momus Petrunkevitch, 1911
D. momus Petrunkevitch, 1925
D. momus Banks, 1929

Originally reported from Guatemala and Panama and only known from females. Reported from the Canal Zone by Mr. Banks ('29). His single specimen is much smaller than mine, which have come from the mountains and there are certain other differences which make me regard his identification with uncertainty. I have four specimens from Boquete, R. P., July, 1939, which agree well with Cambridge's description, and two others from El Valle, R. P., July, 1936, which I am tentatively assigning to this species although I consider the identification somewhat uncertain. It seems rather probable that *M. momus* may be the female of a species of Parnaenus.

Metaphidippus ochraceus F. Cambridge, 1901

Dendryphantes ochraceus Petrunkevitch, 1911

There are in my collection ten specimens from Boquete, R. P., July, 1939, which I am tentatively placing in this species, previously known only from Guatemala. In several respects the characters agree well with Cambridge's description, but in some others they do not. Also known only from females.

Metaphidippus octonotatus F. Cambridge, 1901

Dendryphantes octonotatus Banks, 1909
D. octonotatus Petrunkevitch, 1911
D. octonotatus Petrunkevitch, 1925

Cambridge had both sexes from Guatemala. Mr. Banks ('09) referred three females to the species, and there is one female in the Peckham collection also placed here. Professor Petrunkevitch referred three immature females from Cerro Flores to the species. So far as I know, this is the only record from Panama. Knowing how unreliable identifications from immature specimens have proven to be, I think

there is reason to doubt the accuracy of the record. I have included the species in my list but not in the key to males.

METAPHIDIPPUS PERSCITUS spec. nov.

Figures 272–275

Male holotype. Total length 3.84 mm. Carapace 1.86 mm. long, 1.35 mm. wide at level of PLE which occupy nearly the full width of the carapace at their level, .94 mm. tall and, therefore, a little less than three fourths as tall as wide; surface finely granulated, especially in interocular region; with many black bristles around eyes, but few hairs anywhere; median longitudinal thoracic groove of moderate length just at beginning of steep posterior declivity which occurs about one fourth of distance from PLE to posterior border.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of ALE are slightly above those of AME. Posterior row wider than anterior row in ratio of 21 : 19, wider than middle row in ratio of 21 : 16. Quadrangle of laterals wider than long in ratio of 21 : 15. Total eye space occupies seventeen twenty-ninths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 18 : 10 : 2.25 : 9. AME barely separated from one another, from ALE by one twelfth of their diameter. Middle eyes closer to ALE than to PLE in ratio of 5 : 7. Height of clypeus equal to one eighteenth of diameter of AME. Clypeus decorated only with a ventral row of slender bristles and a single long stiff bristle in lower angle between AME.

Chelicerae. Porrect, slender; divergent from near bases; strongly produced; basal segment 1.20 mm. long. Fang long, slender; bent sharply near base, then nearly straight until attenuated near tip which is bent toward groove; only slightly sinuous. Fang groove with three teeth all close together near medial end and all on a broad low tubercle; two small promarginal teeth and a single long slender retromarginal tooth (Fig. 272). No tooth on fang or near base of fang on basal segment.

Maxillae. Parallel; longer than wide in middle in ratio of about 2 : 1; broadly concave along outer border; with no tubercle at outer distal angle; considerably excavated contiguous to lip.

Lip. Only slightly longer than wide at base; strongly convex along posterior surface. Sternal suture gently procurved.

Sternum. Strongly convex in posterior three fifths; elongate scutiform; longer than wide in ratio of 39 : 22; widest between second coxae;

anterior border slightly narrower than base of lip; posterior end blunt and not extended between fourth coxae which are separated by about one fifth of their diameter. Fourth coxae much the stoutest.

Legs. 1423. Tibial index of first leg 15, of fourth leg 14. Legs with a moderate supply of hair but with no fringes.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
			(All measurements in millimeters)			
1.	1.22	.71	1.02	.83	.46	4.24
2.	.87	.50	.64	.60	.35	2.96
3.	.89	.40	.58	.62	.36	2.85
4.	1.02	.50	.83	.65	.38	3.38
Palp	.64	.26	.20	—	.45	1.55

Spines. First leg: femur dorsal 0–0–1–1–1–0, prolateral distal 1; patella 0; tibia only ventral 2–2–2 (not paired regularly), promarginal series occupying distal three fifths of segment, retromarginal series the distal four fifths (Fig. 273); metatarsus only 0–2–2 ventral. Second leg: femur, patella, and metatarsus as in first; tibia only ventral 1r–0–2. Third leg: femur and patella as in first; tibia only ventral 0–0–1p; metatarsus only prolateral 0–2 and retrolateral 0–1. Fourth leg: femur dorsal 0–0–1–1–1, prolateral and retrolateral distal 1; patella 0; tibia 0; metatarsus only prolateral and retrolateral 0–1. Palpal spines: only femur dorsal 0–1–1–1.

Palp. Femur curved dorsoventrally; both tibia and patella short; tibial retrolateral apophysis a short spur, broad at base, and slightly hooked distally; bulb only moderately swollen, with the usual small, somewhat rugulose lobe at anterior end from whose anterior margin arises a somewhat slender, terminally blunt and very slightly bifurcated spine (embolus) (Figs. 274–275).

Abdomen. Ovoid; longer than wide in ratio of 17 : 9; posterior end rounded almost as much as base; strongly chitinized throughout central region; anal tubercle with a white tuft of hairs; spinnerets as usual in the genus; tracheal spiracle with a distinct lip but no tubercle.

Color in alcohol. A very dark species. Carapace: generally and nearly uniformly rich dark mahogany brown with a few iridescent greenish scales; eyes on black spots; no white stripes or white spots. Mouth parts and sternum dark mahogany brown. First pair of legs and palps dark brown, lighter above and with numerous white lanceolate hairs on most segments; other legs generally a yellowish or light amber with dark brown markings; second, third, and fourth femora dark brown except dorsally lighter and amber at proximal ends. Abdo-

men: central dorsal area a medium shiny brown containing a pair of small white spots near middle; about half-way from there to posterior end is a pair of narrow transverse white bars extending ventrally over about half the lateral area; near the base are two more small white spots on each side the more anterior being considerably elongated (altogether eight small white spots dorsally and dorsolaterally;) lateral regions generally dull gray brown except as noted; venter brown bordered by a row of yellowish dots on each side and containing near the center two rows of obscure yellowish dots.

Type locality. Male holotype and three male paratypes from El Valle, R. P., July, 1936.

Metaphidippus quadrinotatus F. Cambridge, 1901

Dendryphantes quadrinotatus Banks, 1909
D. quadrinotatus Petrunkevitch, 1911
D. quadrinotatus Petrunkevitch, 1925

Cambridge had only females from Panama and Costa Rica. Banks reported the species from Costa Rica. Cambridge's figures leave no reasonable doubt as to the correct placement of this species, I believe. In alcohol the carapace is generally reddish brown, a darker shade laterally and along the steep posterior declivity; the interocular area is also dark brown with eyes on black spots; considerable iridescence nearly everywhere due to presence of many scales; the clypeus is covered by a thick coat of lanceolate white hair which continues less abundantly beneath ALE and PLE; beginning at PME is a narrow white stripe which widens and continues in rather poorly defined way to steep posterior declivity where the stripes from each side nearly meet; from a short distance behind PLE to beginning of steep descent occurs a light brown, transverse bar. It would seem very probable that Cambridge's specimens were badly worn so that many of the distinctive markings were lacking. The abdomen shows a distinct yellowish white basal band; this continues on each side as a narrow stripe almost to the short whitish transverse mark separating the black spots which suggested the specific name. The epigynum also appears to be quite distinctive; its posterior notch mentioned by Cambridge and so well figured by him is, in reality, an opening into a recess of considerable size. It seems probable that these females belong with the males of one of the species of Parnaenus described here as new and known only from males.

Two specimens from Canal Zone Forest Reserve, C. Z., Aug., 1939 and one from the Canal Zone Biological Area, July, 1939.

Genus Parahentzia Bryant 1943

Parahentzia insignita spec. nov.

Figures 276–280

Upon the basis of an examination of the genotype, *P. mandibularis* Bryant, I place this species in this genus. I also suggest the probability that *Hentzia* (*Wala*) *parallela* (Peckham) will be found to belong in the same genus.

Male holotype. Total length 4.86 mm. Carapace 2.08 mm. long, 1.73 mm. wide a short distance behind PLE which occupy nearly four fifths of the width of the carapace at their level, .89 mm. tall and, therefore, .51 as tall as wide; ascent from AME very gradual to PLE; descent from PLE very gradual to steep posterior declivity which begins nearly two thirds of the distance from PLE to posterior border; a short median longitudinal groove about half-way between PLE and the beginning of the steep declivity; well rounded laterally from just behind ALE, interocular area finely granulated; lateral sides with a covering of lanceolate hairs to be noted later; numerous long bristles around first row of eyes.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one eighteenth of the diameter of AME. Posterior row wider than anterior row in ratio of 41 : 39, wider than middle row in ratio of 41 : 37. Quadrangle of laterals wider than long in ratio of 41 : 24. Total eye space occupies fifteen thirty-seconds of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 19 : 8.5 : 2 : 7.5. AME separated from one another by about one eighteenth of their diameter, from ALE by about one eighth of their diameter. Middle eyes closer to ALE than to PLE in ratio of 10 : 13. Height of clypeus barely one nineteenth of the diameter of AME, would be called obsolete by some workers. Clypeus decorated only by a ventral fringe of yellowish bristles, a few convergent bristles beneath AME and, apparently, but one long upturned bristle in lower angle between AME. An unusual arrangement of hairs and coloring beneath and behind ALE as follows: a narrow white

stripe, then a narrow reddish brown stripe, then a broader white stripe, and finally another narrow reddish brown stripe just posterior to ALE.

Chelicerae. Moderately produced and porrect; somewhat divergent, but this is more apparent than real due to shape of basal segment; basal segment .96 mm. long; distinctly flattened and rugulose dorsally (anterior surface); with well developed basal boss; margins strongly chitinized and angular (Fig. 276); at base along outer margin is a fringe of long white hair. Fang of moderate size, moderately sinuous. Fang groove distinct; with two promarginal teeth of moderate size, one is about one fourth the length of the groove from base of fang, the other about three fourths; retromargin with a single simple robust tooth which gives no evidence of being fissidentate like that of female (however some paratypes show slight indication of an obsolescent fissidentate condition).

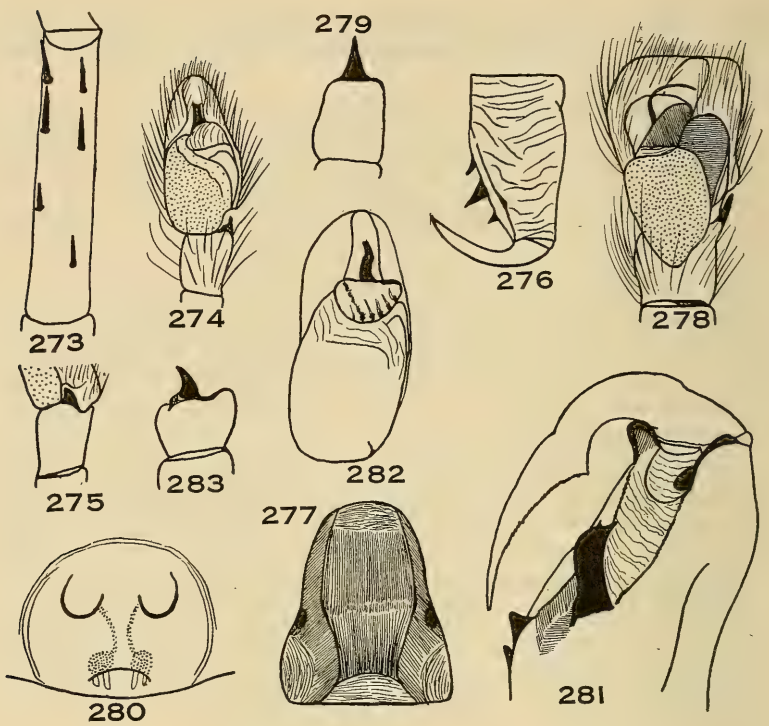
Maxillae. Longer than wide in ratio of about 2 : 1; moderately notched in middle of outer border; considerably broadened distally, with a minute tubercle on outer distal corner; well developed scopula on truncature with remainder of distal border gently rounded; margin contiguous to lip considerably excavated and ridged.

Lip. Rather extraordinarily modified. Longer than wide in ratio of 11 : 10; basal excavations very short; extremely thick and massive; excavated along lateral margins especially in basal two thirds; medial margin of excavations strongly ridged; reaches just beyond middle of maxillae (Fig. 277). Sternal suture procurved.

Sternum. Scutiform; quite convex and flattened centrally; longer than wide in ratio of 4 : 3; anterolateral corners mildly excavated; anterior border somewhat ridged and not quite as wide as base of lip; widest between second coxae; posterior end a minute point, not extended between fourth coxae which are separated by a little more than one fifth of their diameter.

Legs. 1423. Tibial index of first leg 16, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.44	1.02	1.25	.90	.51	5.12
2.	1.02	.58	.64	.62	.35	3.21
3.	.96	.45	.51	.64	.35	2.91
4.	1.25	.64	.85	.73	.38	3.85
Palp	.77	.26	.19	—	.51	1.73



External Anatomy of Spiders

Fig. 273. *Metaphidippus perscitus* Chickering; first tibia, ventral view.
Figs. 274–275. *M. perscitus* Chickering; male palp, ventral view; and palpal tibia, retrolateral view.
Fig. 276. *Parahentzia insignita* Chickering; male chelicera, front view.
Fig. 277. *P. insignita* Chickering; male lip, posterior view.
Figs. 278–279. *P. insignita* Chickering; male palp, ventral view; and palpal tibia, retrolateral view.
Fig. 280. *P. insignita* Chickering; epigynum, ventral view.
Fig. 281. *Paraphidippus perpastus* Chickering; male chelicera.
Figs. 282–283. *P. perpastus* Chickering; male palpal tarsus, ventral view; and palpal tibia, retrolateral view.

First leg considerably enlarged, and with a short ventral fringe of black clavate hairs along the distal half of the retromargin of the ventral surface of the femur and similarly throughout the patella; elsewhere with a moderate supply of hair.

Spines. First leg: femur dorsal 0–1–1–1–0, prolateral 0–0–1–1–0; patella only prolateral 0–1–0; tibia only ventral 2–2–2, promarginal series occupying distal two thirds of segment, retromarginal series the distal three fourths; metatarsus only ventral 2–2. Second leg: femur as in first except retrolateral distal 1; patella 0; tibia prolateral 0–1, ventral 1r–2+2; metatarsus only ventral 2–2. Third leg: femur dorsal 1–1–1, prolateral distal 2, retrolateral distal 1; patella 0; tibia prolateral and retrolateral distal 1, ventral 0–0–2; metatarsus prolateral 0–2, retrolateral 0–1, ventral 0–2. Fourth leg: femur and patella as in third except femur prolateral only distal 1; tibia only ventral 1p–0–2; metatarsus as in third except prolateral only 0–1. Palpal spines: apparently only femur dorsal 0–0–1.

Palp. Resembles that of Hentzia. Patella and tibia both short, with latter about three fourths as long as former; tibial retrolateral apophysis a simple, rather slender spur, nearly straight; bulb moderately swollen, largely overlaps the tibia, with two anterior lobules; embolus arises as a very slender filament near distal end of bulb and curves in a broad arc to near distal end of cymbium (Figs. 278–279).

Abdomen. Nearly cylindrical in form; longer than wide in ratio of about 25 : 9, widest near middle; anal tubercle prominent with a broader basal part and a smaller terminal cone; six spinnerets with anterior pair approximate and stoutest, posterior pair longest and with two distinct segments, a longer basal segment and a shorter terminal segment; position of colulus obscured by white hairs; tracheal spiracle near base of spinnerets, with distinct lip but no tubercle.

Color in alcohol. Carapace: generally bright reddish brown, with all eyes on black spots and ventral margin nearly black with many streaks; a broad lateral white stripe on each side, due to lanceolate hairs, begins at ALE and extends below PME and PLE nearly to posterior border; frontal stripes described with carapace visible only from in front. Chelicerae, lip, and maxillae a rich dark brown, the two latter with whitish tips. Palps reddish brown. Legs: first pair bright reddish brown, lighter above and with a plentiful supply of white hairs on dorsal and prolateral surfaces; other legs unicolorous yellowish white. Abdomen: a fairly broad, reddish brown stripe extends from base to anal tubercle; on each side of this central stripe is a narrow whitish stripe also extending the length of the abdomen, the anterior

end of each is definitely white while the remainder is whitish due to presence of lanceolate hairs over a reddish brown background; lateral sides and base dark reddish brown becoming somewhat lighter on venter where lung areas are yellowish white. The paratypes show considerable variation in degree of color, but the pattern is quite consistently followed.

Female allotype. Total length 4.48 mm. Carapace 1.95 mm. long, 1.60 mm. wide a short distance behind PLE which occupy about seven eighths of width of carapace at their level; .80 mm. tall and, therefore, exactly half as tall as wide; with a short median longitudinal thoracic groove less than one third of the distance from PLE to beginning of posterior steep declivity; in addition to ordinary bristles around eyes a special pair of robust erect broad bristles project from margin on each side beneath the interval between ALE and PME, also another somewhat similar bristle above and a little in front of the more robust pair. General form as in male.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about two seventeenths of the diameter of AME. Posterior row wider than anterior row in ratio of 43 : 39, wider than middle row in ratio of 43 : 36. Quadrangle of laterals wider than long in ratio of 43 : 24. Total eye space occupies almost half the length of the carapace. Ratio of eyes AME: ALE : PME : PLE = 17 : 8.5 : 2 : 7.5. AME separated from one another by one ninth of their diameter. Middle eyes closer to ALE than to PLE in ratio of 10 : 13. Height of clypeus equal to nearly one fourth of the diameter of AME. Clypeus decorated with a rich coat of loose yellowish white lanceolate hairs, and probably the usual three long upturned yellowish bristles in the lower angle between AME.

Chelicerae. Rather small; vertical, parallel; based segment .50 mm. long; medial border with many yellowish bristles; basal third covered in front with short, loose, yellowish white, lanceolate hairs or scales. Fang of moderate size, evenly curved. Fang groove distinct; with two small promarginal teeth; with a single, robust, typically fissidentate retromarginal tooth.

Maxillae. Essentially as in male except that there is no tubercle on outer distal corner and medial excavations contiguous to lip are much less conspicuous.

Lip and *Sternum.* Essentially as in male except the somewhat exaggerated features in that sex are toned down in the female.

Legs. 1432. Tibial index of first leg 26, of fourth leg 17.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.08	.64	.80	.64	.38	3.54
2.	.90	.58	.51	.50	.32	2.81
3.	.96	.51	.51	.58	.32	2.88
4.	1.03	.59	.70	.70	.32	3.34

First leg much enlarged; with a fringe of a few black and fewer white clavate hairs in same position as found in male.

Spines. First leg: essentially as in male. Second leg: as in male except tibia ventral 2–2–2. Third leg: femur, patella, and metatarsus as in male; tibia as in male except ventral 0–1p–2. Fourth leg: as in male. Palpal spines: only femur dorsal 0–1.

Abdomen. Generally less cylindrical than in male; slightly flattened dorsoventrally; longer than wide in ratio of 40 : 19; widest about one fourth from base; position of vestigial colulus clearly marked by a more strongly chitinized area and a tuft of black hairs. Otherwise essentially as in male.

Epigynum. Rather small and inconspicuous; a short distance from the posterior margin there is a lip dorsal to which lies a small recess with tubules; anterior half contained a transverse depression with two deeper depressions about the diameter of one of them apart (Fig. 280).

Color in alcohol. Reminiscent of the females of Hentzia. Carapace: ground color light yellowish brown, with all eyes except AME on black spots; ventral margin with a narrow black line; just ventral to PLE is a short, light, reddish brown stripe extending back about halfway to steep posterior declivity; about the middle of the lateral sides is a narrow, light brownish stripe extending from just below ALE to posterolateral corner; just in front of the steep posterior declivity is a pair of light reddish brown, irregular spots; in center of interocular area is a large clear spot which appears dark in certain light. Palps yellowish white. Chelicerae the same, each with an irregular reddish brown spot in front. Maxillae and lip light amber with whitish tips. Sternum clear yellowish white. Legs: yellowish white; first pair with light reddish brown prolateral spots at distal ends of femora, patellae, and tibiae; all others without spots. Abdomen: yellowish white with a series of four pairs of short reddish brown dorsal spots in anterior three quarters; the last pair of these spots join across the dorsum; behind the spots are two narrow recurved bars; lateral sides irregularly spotted with reddish brown. Considerable variation in respect to dorsal abdominal color pattern has been noted among paratypes.

Type locality. Male holotype from Canal Zone Biological Area, June, 1934; female allotype from the same locality, June, 1939. Numerous paratypes from the following localities: Canal Zone Biological Area, June–July, 1934; July, 1936; June, Aug., 1939; Ft. Randolph, C. Z., Aug., 1936; Boquete, R. P., July, 1939 (common).

Genus Paraphidippus F. Cambridge, 1901

Apparently this genus has previously been unknown from Panama. I have four species which must be placed in the genus.

Key to the species of Paraphidippus from Panama

Males

1. First pair of legs with well developed ventral fringe of black uncurled hairs Chelicera: retromargin of fang groove with a single tooth of moderate size close to promarginal teeth at medial end; fang without definite tooth on inner surface; basal segment without well developed tubercle near base of fang. Palp: tibial apophysis a stout spur, somewhat geniculate in middle; embolus a slender, ventrally curved spine arising from middle of anterior border of distal lobe of bulb ..... *P. aurantius*, (p. 323)
1. Not with combination of characters given above 2
2. First pair of legs with strongly developed ventral fringe of dark curled hairs. Chelicera: retromargin of fang groove with a large, distally birfucate tooth well separated from promarginal teeth; fang with a distinct low tooth near middle of its inner surface; basal segment with a low blunt tubercle on each side near base of fang. Palp: tibial apophysis a short stout spur, directed obliquely toward ventral side of bulb; embolus a moderately slender, somewhat sinuous, distally truncate and ventrally curved spine ..... *P. perpastus*, (p. 324)
2. Not with combination of characters given above 3
3. First pair of legs with a moderately developed ventral fringe of yellowish hair. Chelicera: retromargin of fang groove with a large curved tooth remote from promarginal teeth, much closer to base of fang; fang without a tooth on its inner surface; basal segment without well developed tubercle near base of fang. Palp: tibial apophysis a stout, distally blunt spur, directed distally; embolus a moderately slender spine, arising on prolateral side of bulb, directed obliquely forward and slightly bifurcate terminally ..... *P. perpolitus*, (p. 326)
3. First pair of legs with a moderately developed ventral fringe of black and white hairs. Chelicera: retromargin of fang groove with a large tooth near base of fang; fang with a low blunt tooth on inner surface about one third from base; basal segment with a bicuspid tooth on prolateral side near base

of fang, and a tubercle on each side near base of fang. Palp: tibial apophysis a very stout pointed spur directly distally; embolus a stout, spiraloid spine arising on retrolateral side of distal lobe of bulb and directed distally ..... *P. validus*, (p. 330)

Females

Only the females *P. validus* sp. nov. and those which I consider to be females of *P. aurantius* (Lucas) are known from Panama. They may be separated by the following key:

1. Anterior row and posterior row of eyes about equally wide; first femora with a row of four or five prolateral spines in distal half of segment; epigynum with a pair of relatively large white contiguous areas occupying center of plate..... *P. validus*, (p 330)
1. Posterior row of eyes definitely wider than anterior row; first femora with only two prolateral spines near distal end of segment; epigynum with a pair of small lateral apertures near middle of plate..... *P. aurantius*, (p. 323)

Paraphidippus aurantius (Lucas), 1833

Salticus aurantius Lucas, 1833
Attus chrysis Walckenaer, 1837
Attus multicolor Hentz, 1844
Philaeus chrysis Peckham, 1888
Paraphidippus chrysis F. Cambridge, 1901
P. multicolor F. Cambridge, 1901
P. aureus F. Cambridge, 1901

This species is believed to have been known under many names for a long time, but the involved synonymy is only given in part here. The species appears to be widely distributed and fairly common in several of our southern states, through all of Central America and a part of the West Indies. It has also been reported from South America. Specimens from Mexico and Costa Rica are in the collections of the Museum of Comparative Zoölogy. The species is reported to be very variable, especially in the female sex. In the male the clypeus has no special decorations but in the female there is a fairly rich growth of long white hair. The promarginal spines on the first tibiae occupy about the distal half of the segment in both sexes. Males have well developed black ventral fringes of uncurled hairs on the first pair of legs; the second pair of legs has a similar but much less well developed fringe. Several males and two mature females from Boquete, R. P., July, 1939.

Paraphidippus perpastus spec. nov.

Figures 281–283

Until recently this species was considered the Panamanian representative of *P. laniipes* F. Cambridge from Mexico. More careful study has made it necessary to recognize it as a new species, probably closely related to *P. laniipes.*

Male holotype. Total length 9.00 mm. Carapace 4.09 mm. long, 3.84 mm. wide slightly behind PLE which occupy nineteen thirtieths of the width of the carapace at their level, 2.13 mm. tall and, therefore, only about .55 as tall as wide; the descent from PLE to posterior border quite abrupt from the first with little difference in the angle of descent anywhere; covered with many black simple hairs, white lanceolate hairs in stripes, and long black bristles especially in the ocular area; a short median longitudinal thoracic groove in a shallow depression slightly behind the posterior borders of PLE.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one fifth of the diameter of ALE. Posterior row wider than anterior row in ratio of 37 : 35, wider than middle row in ratio of 37 : 32. Quadrangle of laterals wider than long in ratio of 37 : 25. Total eye space occupies seven sixteenths of the length of carapace. Ratio of eyes AME : ALE : PME : PLE=32 : 16 : 3 : 14. AME separated from one another by about one sixteenth of their diameter, from ALE by one eighth of their diameter. Middle eyes closer to ALE than to PLE in ratio of about 3 : 5. Height of clypeus equal to seven thirty-seconds of the diameter of AME. Clypeus decorated only by black bristles as follows: a transverse row of long ones through the center, a ventral fringe of shorter ones, and three long stiff upturned ones in lower angle between AME.

Chelicerae. Moderately porrect, somewhat divergent; well rounded in front and not especially swollen; with a ridged basal boss; basal segment 2.18 mm. long. Fang fairly robust, somewhat sinuous; with a blunt tooth on inner surface about the middle; with a low ridge extending transversely across the retrolateral surface from the tooth; with fine serrations distal to the tooth. Fang groove deeply excavate, transversely rugulose, with pronounced margins; near base of fang on prolateral side is a low blunt tubercle and opposite it is another on the retrolateral side; promargin with two small teeth near medial end; retromargin with a single robust tooth arising about two thirds from base of fang, turned toward base of fang, and ending in a bidentate tip (Fig. 281).

Maxillae. Slightly convergent; longer than wide in middle in ratio of 67 : 30; deeply notched in middle of outer border; somewhat smoothly excavated contiguous to lip; palp inserted into basal third; outer distal corner with a robust tubercle which turns distally.

Lip. As wide as long; basal excavations reach about one third the length of organ; reaches to middle of maxillae. Sternal suture straight or slightly procurved.

Sternum. Elongate scutiform; longer than wide in ratio of about 13 : 10; widest between second coxae, not much narrower between first; anterior border slightly narrower than base of lip; quite convex in posterior half; posterior end blunt and not extended between fourth coxae which are separated by a little less than one fifth of their diameter.

Legs. 1423. Tibial index of first leg and fourth leg 15.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	3.33	2.18	3.01	2.49	1.02	12.03
2.	2.43	1.54	1.60	1.66	.70	8.00
3.	2.43	1.22	1.33	1.66	.77	7.41
4.	2.75	1.41	1.94	1.98	.90	8.98
Palp	1.79	.51	.30	—	1.47	4.07

All legs with considerable simple black hair and white lanceolate hair. First pair of legs with a heavy black ventral fringe beginning on retromargin of the femur but best developed on patella, tibia, and metatarsus, the hair on these three segments being notably curled as described in *P. laniipes;* a weakly developed fringe also present on second legs but the hairs are only slightly curled.

Spines. First leg: femur dorsal 0–1–1–1, prolateral distal 2; patella 0; tibia only ventral 2–2–2, promarginal series occupying distal three fifths of segment while retromarginal series occupies a somewhat greater distance; metatarsus only ventral 0–2–2. Second leg: femur and patella as in first; tibia only prolateral 0–1, ventral 0–1r–2–2; metatarsus only ventral 0–2–2. Third leg: femur and patella as in first except femur retrolateral distal 1; tibia prolateral 0–1–0, retrolateral 0–1–1–0, ventral 0–0–2; metatarsus prolateral 0–2, retrolateral 1–2, ventral 0–2. Fourth leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 1; patella 0; tibia only retrolateral 0–1–1–0, ventral 1p–0–2; metatarsus prolateral 0–1, retrolateral 0–2, ventral 0–2. Palpal spines: only femur dorsal 0–1–1.

Palp. Femur only moderately curved dorsoventrally; both patella and tibia short with the latter about three fifths as long as the former;

tibial retrolateral apophysis a simple short spur directed obliquely toward ventral side; tarsus with bulb moderately swollen, cymbium excavated contiguous to tibial spur, tarsal spine arises from middle of anterior border of small distal lobe of bulb, twists a little but maintains a nearly uniform width to its termination (Figs. 282–283).

Abdomen. Ovoid, longer than wide in ratio of about 16 : 9; widest about two fifths from base; other features as usual in the group.

Color in alcohol. Carapace: a deep reddish brown, eyes on black spots; interocular area darker; a dorsolateral white stripe made by lanceolate hairs extends from ALE, where it is very narrow, beneath PLE almost to posterior border; black hairs along lateral sides add a deeper color to those regions; surface with short narrow black dotted intercommunicating lines. Chelicerae a deep reddish brown; maxillae and lip the same with yellowish white tips. Sternum reddish brown. All legs and palps reddish brown, more or less streaked with lighter brown, especially on dorsal sides; first pair of legs somewhat the darkest, but the pairs progressively lighter toward fourth. Abdomen: central dorsal area bright mahogany brown as though varnished; with five pairs of small white spots, the fourth pair is extended transversely to connect with a dorsolateral white stripe which becomes a basal band anteriorly and ceases before reaching the spinnerets; lateral sides brownish with narrow, lighter colored stripes; venter with a brownish central broad stripe bordered by a row of yellowish dots on each side. There is some iridescence on both carapace and abdomen.

Type locality. Male holotype and one male paratype from Boquete, R. P., July, 1939.

Paraphidippus perpolitus spec. nov.

Figures 284–287

This is the species identified by Mr. Banks ('29) as *Dendryphantes dentiger* (F. Cambridge). I cannot agree with this identification and I am compelled to regard it as new to science. According to my records *M. dentiger* F. Cambridge has not been found in Panama. I place the species in the genus Paraphidippus on the basis of: the fringe on the first pair of legs; the fact that PLE are far from the lateral border of the carapace; the laterally rounded and full carapace; and a few other features. It must be admitted, however, that there are also some features which are generally considered to be characteristic of Metaphidippus and Parnaenus.

Male holotype. Total length 3.97 mm. Carapace 1.95 mm. long, 1.60 mm. wide opposite PLE which occupy five sixths of width of carapace at their level, .90 mm. tall and, therefore, about .56 as tall as wide; descent behind PLE very slight until steep posterior declivity is reached which begins a little more than half-way from PLE to posterior border; laterally well rounded from ALE to steep declivity; surface finely granulate, especially in interocular area; a short median longitudinal thoracic groove lies about half-way from PLE to beginning of steep declivity.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of AME and ALE are almost exactly level. Posterior row just slightly wider than anterior row, wider than middle row in ratio of 31 : 26. Quadrangle of laterals wider than long in ratio of 31 : 18. Total eye space occupies about four ninths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE=18 : 9.5 : 2.5 : 8.5. AME separated from one another by one eighteenth of their diameter, from ALE by one ninth of their diameter. Middle eyes closer to ALE than to PLE in ratio of 9: 11. Height of clypeus equal to two ninths of the diameter of AME. Clypeus decorated with a brush of dull yellowish, lanceolate hair, a single stiff brownish bristle beneath outer border of each AME, and three bristles in lower angle between AME.

Chelicerae. Porrect, divergent, slender, strongly produced; basal segment 1.02 mm. long. Fang long, slender, sinuous, without a tooth. Fang groove well defined but only excavated near base of fang; promargin with two small teeth near medial end of groove; retromargin with a single long slender tooth, evenly curved toward base of fang; with no well developed tubercles near base of fang (Fig. 284).

Maxillae. Essentially parallel; longer than wide in middle in ratio of 25 : 11; acutely notched in middle of outer border and angulate at both inner and outer distal angles but without tubercle or hook.

Lip. As wide as long; basal excavations reach about one third of length of organ; reaches to middle of maxillae. Sternal suture gently procurved.

Sternum. Elongate scutiform, longer than wide in ratio of about 3 : 2; widest between second coxae but not much narrower between first and third coxae; anterior border slightly narrower than base of lip; strongly convex in posterior two thirds; posterior end bluntly rounded and not extended between fourth coxae which are separated by one third of their diameter. First coxae much the stoutest.

Legs. 1423. Tibial index of first leg 18, of fourth leg 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.15	.77	.96	.70	.39	3.97
2.	.96	.57	.64	.58	.32	3.07
3.	.96	.46	.52	.58	.38	2.90
4.	1.15	.57	.77	.70	.32	3.51
Palp	.64	.19	.13	—	.56	1.52

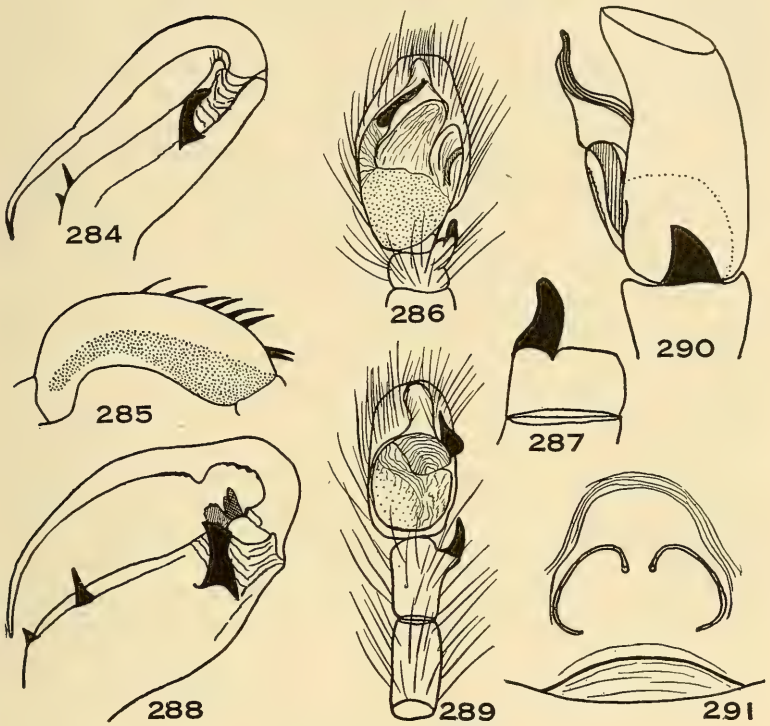
All legs with a moderate supply of hair as usual. First pair with a definite and fairly well developed pale, light colored fringe on both prolateral and ventral surfaces of all segments beginning with femora, but weak on metatarsi and tarsi. First legs much the stoutest.

Spines. First leg: femur dorsal 0–1–1–1, prolateral distal 2; patella only prolateral 0–1–0; tibia only ventral 2–2–2, not well matched, promarginal series occupying less than the distal half of segment and retromarginal series occupying about the distal three quarters; metatarsus only ventral 0–2–2. Second leg: femur and patella as in first except femur retrolateral distal 1; tibia only prolateral 0–1–1–0 and ventral 1r–0–2 on right, 1r–1r–2 on left; metatarsus only prolateral 1–0 and ventral 2–2. Third leg: femur as in second; patella only retrolateral 0–1–0; tibia prolateral 0–1–0, retrolateral 0–1–1–0, ventral 0–0–2; metatarsus prolateral and retrolateral 1–2, ventral 1p–2. Fourth leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 1; patella as in third; tibia only ventral 0–0–2 and retrolateral 0–1–0; metatarsus prolateral and retrolateral 1–1, ventral 0–2. Palpal spines: only femur dorsal, eight in distal half of segment, seems to be a very distinctive specific character.

Palp. Femur quite strongly curved dorsoventrally and somewhat enlarged in distal half, also with eight dorsal spines in distal half of segment, a distinctive character; both patella and tibia short with latter about two thirds as long as former segment; tibial retrolateral apophysis a stout, thumb-like spur; base of cymbium with a strongly chitinized dorsal lobule contiguous to tibia; bulb without an anterior rugulose lobe but with a flat thin plate rounded anteriorly; tarsal spine (embolus) arises on prolateral side from a small rugulose region and curves forward just anterior to apex of bulb where its tip seems to be slightly bifurcated (Figs. 285–287).

Abdomen. Ovoid, longer than wide in ratio of nearly 2 : 1; widest near middle; anal tubercle, spinnerets, and tracheal spiracle as usual in the group; position of colulus indicated by a small tuft of stiff black hairs.

Color in alcohol. Carapace: almost black in ocular and interocular



External Anatomy of Spiders

Fig. 284. *Paraphidippus perpolitus* Chickering; male chelicera.
Fig. 285. *P. perpolitus* Chickering; male palpal femur, prolateral view.
Figs. 286–287. *P. perpolitus* Chickering; male palp, ventral view; and palpal tibia, retrolateral view.
Fig. 288. *P. validus* Chickering; male chelicera.
Figs. 289–290. *P. validus* Chickering; male palp, ventral view; and palpal tibia and tarsus, retrolateral view, larger scale.
Fig. 291. *P. validus* Chickering; epigynum, ventral view.

region; a broad light reddish brown stripe beginning below ALE on each side passes obliquely backwards and dorsally to region behind PLE where the two meet in a narrow band at level of median thoracic groove; a very narrow stripe of white lanceolate hairs just below PLE from ALE and a few isolated white lanceolate hairs generally distributed over the surface; steep posterior declivity and lateral posterior parts almost black. Chelicerae and maxillae yellowish white. Sternum dark brown and lip lighter brown. Palp: tarsus, tibia and patella dark brown, cymbium almost black; femur yellowish white with a broad prolateral brown stripe lacking for a short distance at proximal end, and a short retrolateral brown stripe only at distal end (Fig. 285). First pair of legs yellowish white, dusted with brown; other legs similar except all three pairs of femora almost black and distal ends of third and fourth patellae and tibiae brownish. Abdomen: dorsal area reddish brown with a faint lanceolate darker basal stripe and three pairs of dark brown spots in posterior two thirds; a white narrow basal band continues dorsolaterally as a stripe reaching a little more than halfway to the spinnerets; a white dorsolateral spot on each side extends dorsally to lie partly between the second and third pair of dark spots; anal tubercle with a snow white tuft of hairs; base and lateral sides dark brown; venter light brown bounded by a line of yellowish dots on each side and enclosing a pair of obscure rows of dots near center.

Type locality. Male holotype from Canal Zone Biological Area, August, 1939. No paratypes.

Paraphidippus validus spec. nov.

Figures 288–291

Male holotype. Total length 8.96 mm. Carapace 3.52 mm. long, 3.01 mm. wide slightly behind PLE which occupy two thirds of the width of the carapace at their level, 1.73 mm. tall and, therefore, about .57 as tall as wide; PME and PLE on low tubercles; as seen in profile, the descent is abrupt from PLE for a short distance, then very gradual for another short distance to the steeper declivity which continues to posterior border; a short median longitudinal thoracic groove at bottom of first abrupt descent behind PLE.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one sixteenth of diameter of ALE. Anterior row slightly wider than posterior row, wider than middle row in ratio of 65 : 58. Quadrangle of laterals wider than long in ratio of about 13 : 9. Total eye space occupies twenty-five fifty-thirds of length of carapace. Ratio of eyes AME : ALE : PME :

PLE=31 : 16.5 : 3.75 : 14.5. AME almost contiguous, separated from ALE by one tenth of their diameter. Middle eyes closer to ALE than to PLE in ratio of 3 : 5. Height of clypeus equal to about one tenth of diameter of AME. Clypeus decorated by a row of slender white bristles along ventral margin, two long brownish bristles beneath lateral border of each AME, a fringe of loose white lanceolate hairs and three brownish bristles in lower angle between AME.

Chelicerae. Porrect, strongly divergent, strongly produced; with well developed and ridged basal boss; basal segment 2.11 mm. long. Fang long, sinuous; with a stout tooth on its inner surface about two sevenths from base; with small transverse ridges distal and proximal to tooth. Fang groove strongly developed; on prolateral side of basal segment near base of fang is a stout tooth divided distally into two cusps, also near base of fang on both sides occurs a well developed tubercle or cusp; two promarginal teeth, a small median one and a fairly long pointed one at about a third of the distance from the small tooth to base of fang; retromargin with a single robust, curved, distally flattened, and somewhat widened tooth two fifths of the distance from the base of fang to medial end of groove; a well developed rugulose ridge from the large tooth to tubercle near base of fang (Fig. 288).

Maxillae. Parallel; longer than wide in middle in ratio of about 7 : 3; quite deeply concave along middle of outer border; outer distal corner smoothly rounded and without a tubercle or hook; palp inserted into basal third.

Lip. Longer than wide in ratio of about 11 : 9; basal excavations reach about two fifths the length of the organ; reaches to middle of maxillae. Sternal suture plainly procurved.

Sternum. Elongate scutiform; longer than wide in ratio of 13 : 9; widest between second coxae, but little narrower between first; anterior border almost as wide as base of lip; quite convex in posterior two thirds; posterior end blunt and not extended between fourth coxae which are separated by about two ninths of their width. Anterior coxae much the stoutest and nearly twice as long as any other.

Legs. 1423. Tibial index of first leg 12, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	3.77	2.18	3.46	3.20	1.41	14.02
2.	2.30	1.25	1.60	1.94	.70	7.79
3.	2.18	1.15	1.41	1.73	.65	7.12
4.	2.56	1.28	2.05	2.24	.70	8.83
Palp	1.47	.64	.58	—	.71	3.40

All legs with a moderate supply of long light colored hair and shorter dark hair, but only first pair with a definite fringe which extends chiefly on ventral side from patella to tarsus with fullest development on tibia where nearly the proximal third is white, the remainder black. Hairs in fringe not curled.

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral 0–0–1–1–1; patella 0; tibia only ventral 2–2–2, not well matched, promarginal series occupying about the distal seven twelfths of the segment and the retromarginal series slightly more than this; metatarsus only ventral 0–2–2; both tibial and metatarsal spines short for such elongated segments. Second leg: femur dorsal 0–1–1–1, prolateral distal 1; patella 0; tibia only ventral 0–1r–2; metatarsus as in first. Third leg: femur and patella as in second; tibia only retrolateral 0–1–1–0, ventral 0–0–2; metatarsus prolateral and retrolateral 0–1, ventral 0–2. Fourth leg: femur only dorsal 0–1–1–1; patella 0; tibia only ventral 1p–0–2; metatarsus only prolateral 0–1, ventral 0–2. Palpal spines: only femur dorsal 0–1–1.

Palp. Long and slender; patella and tibia longer than usual, the former only slightly longer than the latter; retrolateral tibial apophysis a short robust spur nearly as broad at base as long; tarsal bulb nearly as broad as long; robust tarsal spine (embolus) arises from retrolateral side of distal lobe, is spiraloid and is directed distally (Figs. 289–290).

Abdomen. Generally long and slender; longer than wide in ratio of about 18 : 7, widest about one third from base; anal tubercle plainly composed of two parts, a broader basal half and a slender distal half; spinnerets as usual in the genus; position of colulus indicated by tuft of stiff black hairs; tracheal spiracle near base of spinnerets, with lip but no definite tubercle. Many long erect brownish bristles on dorsum.

Color in alcohol. Carapace: dark reddish brown with many black streaks and intercommunicating lines; a patch of white lanceolate hair between and above PME and PLE and also a very small one between PLE; a nearly square white figure beginning dorsal to AME and passing beneath PME and PLE over to about the middle of the area behind PLE (the white hairs which mark out this figure are so loose that many have, doubtless, been removed in the handling of the specimen); also a narrow white marginal stripe continuous with the clypeal fringe and extending to posterolateral corners. All legs and palps brown, well supplied with white lanceolate hair which covers the coxae dorsally and nearly covers the proximal halves of the first tibiae and dorsal sides of palpal femora. Chelicerae dark reddish brown with basal three fifths of fang nearly black. Sternum, maxillae, and

lip also reddish brown, the latter two parts with yellowish tips. Abdomen: entire dorsal area covered by a reddish brown stripe within which may be seen a central lighter stripe flanked on either side by a darker one; a narrow white basal band continues dorsolaterally as a somewhat broadened stripe on each side nearly to the spinnerets; lateral sides gray-brown with very narrow yellowish stripes; ventral margins of the lateral areas are covered with loose broad white lanceolate hairs; venter gray-brown, bordered on each side by a row of yellowish dots and enclosing a pair of central irregular rows of yellowish dots.

Female allotype. Total length 9.40 mm. Carapace 3.58 mm. long, 3.20 mm. wide opposite PLE which occupy seven tenths of width of carapace at their level; 1.73 mm. tall and, therefore, .54 as tall as wide; other features essentially as in male.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of AME and ALE are almost on a level with one another. Anterior row and posterior row equal in width, wider than middle row in ratio of about 11 : 10. Quadrangle of laterals wider than long in ratio of about 13 : 9. Total eye space occupies thirty-seven fifty-sixths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 30 : 16 : 3.5 : 14. AME separated from one another by one twentieth of their diameter, from ALE by about one sixth of their diameter. Middle eyes closer to ALE than to PLE in ratio of 3 : 4. Height of clypeus equal to one sixth of the diameter of AME. Clypeus decorated as in male.

Chelicerae. Quite robust, slightly porrect, essentially parallel, but outer borders quite convex; surface finely rugulose; with numerous long light brown hairs in front; basal segment 1.28 mm. long. Fang fairly robust, especially in basal two fifths, remainder more slender and evenly curved. Fang groove with two promarginal teeth and a single robust retromarginal tooth about midway between base of fang and medial end of groove.

Maxillae, Lip, and *Sternum.* Essentially as in male.

Legs. 1423. Tibial index of first leg 21, of fourth leg 16.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	3.26	1.73	2.56	2.33	1.03	10.91
2.	2.18	1.15	1.47	1.53	.70	7.03
3.	2.11	1.15	1.37	1.63	.70	6.96
4.	2.62	1.28	1.98	2.25	.70	8.83

Legs hairy as in male, but the ventral fringe on the first pair is less well developed than in that sex; the white part of the fringe is beneath the patella, the proximal half of the metatarsus and the femur are practically devoid of it.

Spines. First and second legs as in male. Third leg: tibia retrolateral 0–0–1–0; metatarsus prolateral 0–2; elsewhere as in male. Fourth leg: metatarsus retrolateral 0–1; elsewhere as in male. Palpal spines as in male.

Abdomen. Essentially as in male.

Epigynum. Small for so large a spider. Epigynal plate with a very broad but shallow posterior marginal notch; somewhat swollen medially; in anterior half are two curved lines facing one another and converging anteriorly, incompletely bounding the central area (Fig. 291).

Color in alcohol. Carapace and mouth parts almost identical with those of male. Legs very similar but proximal ends of first tibiae appear to lack the white patches; more white appears on prolateral side of first patellae and dorsal side of first femora. Abdomen: dorsal region with a light brownish central stripe with three pairs of small white spots along its borders beginning about one fifth from base and ending about one third from posterior end; on each side of central stripe is a dark brownish stripe, much darker in anterior half but lighter in posterior half; all three stripes liberally supplied with iridescent golden scales; a narrow basal white band extends for a short distance along each dorsolateral side; behind these are three white spots on each side, the last being near the posterior end; elsewhere essentially as in male.

Type locality. Male holotype from Canal Zone Biological Area, July, 1934; the female allotype from same locality, June, 1936. Paratypes of both sexes from: Canal Zone Biological Area, June–July, 1936; June–Sept., 1939; Madden Dam region, C. Z., July–Aug., 1936; El Cermeno, R. P., July, 1940 (Zetek).

Genus Parnaenus Peckham, 1896

Key to the species of Parnaenus from Panama

Males

1. Carapace much inflated lateral to ALE and PME; PLE on distinct tubercles. First pair of legs with moderately developed black ventral fringe. Fang groove with a single moderately large retromarginal tooth nearly opposite two smaller promarginal teeth; basal segment without teeth or conspicuous tubercles near base of fang. Palp: tibial apophysis a stout spur, somewhat

geniculate just distal to middle; embolus a slender spine arising from retrolateral side of distal lobe of bulb..... *P. recurvus*, (p. 340)

1. Carapace without marked inflation lateral to ALE and PME; PLE not on distinct tubercle. First pair of legs with only vestiges of a ventral fringe. Fang groove with a moderately large retromarginal tooth near middle; basal segment with a blunt tubercle near base of fang on each side. Palp: tibial apophysis a stout spur somewhat curved ventrally; cembolus a slender filament arising from a pyriform lobule and curving around on retrolateral side through more than a semicircle..... *P. convexus*, (p. 335)

Females

1. Epigynum with a pair of large elongated depressions separated by a flask-shaped septum..... *P. recurvus*, (p. 340)
1. Epigynum with a pair of small depressions in middle of plate, about thre) times the diameter of one of them apart..... *P. convexus*, (p 335)

Parnaenus convexus spec. nov.

Figures 292–297

Male holotype. Total length 6.20 mm. Carapace 2.75 mm. long, 2.24 mm. wide opposite PLE which occupy nearly four fifths of the width of the carapace at their level, 1.41 mm. tall and, therefore, .63 as tall as wide; PLE mounted on low tubercles; descent from PLE only moderate to the steep posterior declivity which begins at about two fifths of the distance from PLE to posterior border; bulges laterally immediately behind ALE, then remains with nearly parallel sides to a little behind PLE; with many black bristles in ocular region and a moderate supply of black simple hair and white lanceolate hair as noted later; with a short longitudinal median thoracic groove just a little posterior to PLE (Figs. 292–293).

Eyes. Seen from in front, anterior row recurved so that dorsal borders of ALE are level with those of AME. Posterior row wider than anterior row in ratio of 21 : 17, wider than middle row in ratio of 21 : 16. Quadrangle of laterals wider than long in ratio of 14 : 9. Total eye space occupies eleven twenty-firsts of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 22 : 11 : 3 : 10. AME separated from one another by one twentieth of their diameter, from ALE by about one tenth of their diameter. Middle eyes closer to ALE than to PLE in ratio of 13 : 23. Height of clypeus equal to one tenth of the diameter of AME. Clypeus decorated only with black bristles as follows: two long ones beneath outer border of each AME, one beneath

middle of each AME, a ventral fringe of short slender ones, and the usual three long ones in lower angle between AME.

Chelicerae. Robust, porrect; divergent from distal end of prominent basal boss; basal segment 1.28 mm. long. Fang long sinuous, with a suppressed tooth on inner margin about the middle. Fang groove absent but replaced by a ridge extending from near base of fang to near the smaller of two promarginal teeth; a short distance from the small tooth is a larger pointed one and near base of fang a blunt tubercle; retromargin with a single large tooth turned toward base of fang where there is another smaller tubercle opposite the larger one (Fig. 294).

Maxillae. Parallel; longer than wide in middle in ratio of about 2 : 1; quite deeply and acutely notched in middle of outer border; outer distal angle rounded; without a tubercle or hook; palp inserted into basal two fifths.

Lip. Longer than wide in ratio of about 13 : 9; basal excavations reach about one third the length of organ; reaches just beyond middle of maxillae. Sternal suture procurved.

Sternum. Elongate scutiform; longer than wide in ratio of 53 : 33; widest between second coxae but only a little narrower between third; anterior border considerably narrower than base of lip; only mildly convex and mostly between second and third coxae; posterior end bluntly rounded and not extended between fourth coxae which are separated by three tenths of their diameter. Anterior coxae much the stoutest.

Legs. 1432. Tibial index of first leg 18, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.79	1.15	1.34	1.08	.64	6.00
2.	1.34	.70	.77	.70	.51	4.02
3.	1.28	.70	.77	.90	.51	4.16
4.	1.66	.95	1.28	1.15	.54	5.58
Palp	1.08	.51	.45	—	.65	2.69

All legs with a moderate supply of short simple dark hair, white lanceolate hair especially on dorsal and prolateral surfaces. First pair with what appears to be remnants of a ventral fringe of dark hair from femora to tarsi but is so poorly developed that its presence may be ignored.

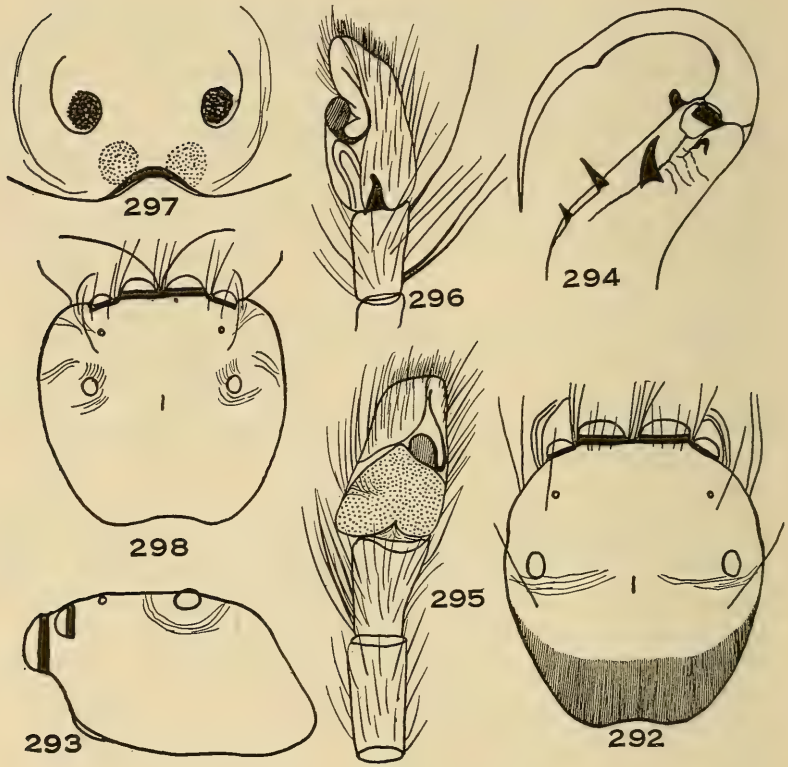
Spines. First leg: femur dorsal 0–1–1–1, prolateral only distal 2; patella only prolateral 0–1–0; tibia only ventral 2–2–2, with pro-

marginal series occupying distal two thirds and retromarginal series a somewhat greater distance; metatarsus only 0–2–2. Second leg: femur as in first except retrolateral distal 1; patella 0; tibia prolateral 0–1–0, ventral 1r–0–2 on right and 1r–1p–2 on left; metatarsus only ventral 0–2–2. Third leg: femur dorsal 1–1–1, prolateral 0–1–2, retrolateral distal 1; patella 0; tibia prolateral 0–1–1, retrolateral 0–1–1–0, ventral 0–0–2; metatarsus prolateral and retrolateral 0–2, ventral 0–2. Fourth leg: femur dorsal and retrolateral as in third, prolateral distal 1; patella 0; tibia only retrolateral 0–1–0, ventral 1p–0–2; metatarsus prolateral and retrolateral 0–1, ventral 0–2. Palpal spines: only femur dorsal 0–1–1.

Palp. Femur slender and moderately bent dorsoventrally, covered dorsally on distal half with many white lanceolate hairs; patella nearly three times as long as broad; tibia about twice as long as broad; patella only a little longer than tibia; tibial retrolateral apophysis a simple, fairly robust, somewhat hooked spur; bulb very broad at base; embolus arises in a pyriform lobule, turns retrolaterally, then distally to make a long sweeping curve (Figs. 295–296).

Abdomen. Ovoid, longer than wide in ratio of 52 : 27; widest about two fifths from base; anal tubercle a short broad cone covered with white lanceolate hairs and a few simple stiff black hairs; spinnerets as usual in the group; position of colulus indicated by a tuft of dark hairs; tracheal spiracle near base of spinnerets, with lip but no tubercle.

Color in alcohol. Carapace: generally dark reddish brown; eyes on black spots; a poorly defined patch ventral to PME much lighter; also a lighter and poorly defined bar behind PLE; two pairs of white spots, the first just behind PME, the second behind PLE; also a narrow white marginal stripe extends from posterior lateral angle to opposite PLE; all white marks made by presence of lanceolate hairs. Chelicerae reddish brown streaked with dark brown. Sternum, maxillae, and lip brownish with many small dark spots and streaks, the two latter with yellowish white tips. Legs: reddish brown, more or less streaked with yellowish; first pair darkest, others progressively lighter to fourth pair; all with many lanceolate white hairs dorsally and, to some extent, prolaterally. Abdomen: dorsal central area brownish with many iridescent scales; posterior half much darker than anterior half with some indications of dark spots (paratypes show four faint dark spots in posterior half); a very narrow basal band widens laterally and passes back as a continuous white dorsolateral stripe on each side to posterior end; lateral sides light reddish brown with many narrow irregular yellowish stripes; venter brownish, lighter in middle.



External Anatomy of Spiders

Figs. 292–293. *Parnaenus convexus* Chickering; male carapace, dorsal view and lateral view.
Fig. 294. *P. convexus* Chickering; male chelicera.
Figs. 295–296. *P. convexus* Chickering; male palp, ventral view and retrolateral view.
Fig. 297. *P. convexus* Chickering; epigynum, ventral view.
Fig. 298. *P. recurvus* Chickering; male carapace, dorsal view.

Female allotype. Total length 8.32 mm. Carapace 3.52 mm. long, 2.78 mm. wide opposite PLE which occupy almost two thirds of the width of carapace at their level, 1.48 mm. tall and, therefore, about .54 as tall as wide. Elsewhere essentially as in male.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of ALE are slightly dorsal to those of AME. Posterior row wider than anterior row in ratio of 19 : 14, wider than middle row in ratio of 19 : 13. Quadrangle of laterals wider than long in ratio of 38 : 23. Total eye space occupies almost exactly half the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 25 : 13 : 3.5 : 12. AME almost contiguous, separated from ALE by one fifth their diameter. Middle eyes closer to ALE than to PLE in ratio of 17 : 30. Height of clypeus equal to one eighth of the diameter of AME. Clypeus decorated as in male.

Chelicerae. Robust, slightly porrect, slightly divergent; considerably swollen in front; basal segment 1.28 mm. long. Fang robust, especially in basal two fifths, evenly curved except for a slight constriction at distal end of robust part. Fang groove well defined; promargin with the usual two teeth, most medial the smaller; retromargin with a single, fairly robust, simple tooth nearly midway from base to inner end of groove.

Maxillae and *Lip.* Essentially as in male.

Sternum. Essentially as in male except areas at anterior lateral corners are somewhat bevelled off as in male of P. recurvus sp. nov.

Legs. 4132. Tibial index of first leg 21, of fourth leg 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.98	1.30	1.47	1.08	.64	6.47
2.	1.73	1.02	1.02	.96	.51	5.24
3.	1.66	.90	1.09	1.08	.64	5.37
4.	2.11	1.15	1.60	1.47	.64	6.97

Hair on legs essentially as in male.

Spines. First leg: as in male. Second leg: as in male except tibia ventral 1r–0–2 on right and 1r–1r–2 on left. Third leg: femur dorsal 0–1–1–1, prolateral distal 2, retrolateral distal 1; patella 0; tibia prolateral and retrolateral 0–1–0, ventral 0–0–2; metatarsus as in male. Fourth leg: as in male. Palpal spines: only femur dorsal 0–1–1.

Abdomen. Somewhat damaged but apparently essentially as in male.

Epigynum. Simple; posterior margin of plate quite deeply notched; swollen centrally in front of notch; on each side of swelling is a small

depression, with the two separated by a distance equal to about three times the diameter of one of them (Fig. 297).

Color in alcohol. Essentially as in male. Damage to abdomen makes close similarity somewhat uncertain for the dorsum.

Type locality. Male holotype and female allotype from Canal Zone Biological Area; taken by Dr. James Zetek in a Berlese funnel along with much other material, July, 1943–March, 1944. Two male paratypes from same locality, June–July, 1939.

Parnaenus recurvus spec. nov.

Figures 298–303

This species is regarded as a close relative of *P. cyanidens* (C. Koch).

Male holotype. Total length 9.15 mm. Carapace 4.48 mm. long, 4.16 mm. wide about opposite PLE which occupy two thirds of the width of the carapace at their level, 2.56 mm. tall and, therefore, .61 as tall as wide; PME on prominent tubercles; steep posterior declivity begins one third of distance from PLE to posterior border (Figs. 298–299); a short median longitudinal thoracic groove begins opposite posterior border of PLE; notably swollen laterally opposite ALE and PME.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME cut off about one third of the diameter of ALE. Posterior row slightly wider than anterior row, wider than middle row in ratio of 40 : 33. Quadrangle of laterals wider than long in ratio of 20 : 13. Total eye space occupies about three sevenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 32 : 17 : 3.5 : 14. AME separated from one another by one sixteenth of their diameter, from ALE by one sixth of their diameter. Middle eyes closer to ALE than to PLE in ratio of 2 : 1. Height of clypeus equal to about one fifth of the diameter of AME. Clypeus decorated only with short weak dark bristles near ventral margin, a transverse row of longer black bristles and three long stiff bristles in lower angle between AME.

Chelicerae. Porrect, robust, strongly divergent; basal segment 2.94 mm. long; much swollen in middle dorsolaterally; with a prominent basal boss. Fang fairly robust; moderately sinuous; somewhat swollen in middle of inner surface, perhaps indicating the position of a greatly reduced fang tooth. Fang groove well defined, transversely rugulose, with granular surface; promargin with two teeth, a very small one

and a larger one, both mounted on a low common tubercle; retromargin with a single fairly robust tooth opposite the two promarginal teeth (Fig. 300).

Maxillae. Parallel; excavated contiguous to lip; longer than wide in middle in ratio of about 2 : 1; mildly concave along outer border; outer distal angle well rounded and without either a tubercle or a hook.

Lip. Almost as wide as long; basal excavations reach only about one fourth the length of the organ; reaches just beyond middle of maxillae; much narrowed at distal end; strongly convex in middle from base to distal border. Sternal suture quite strongly procurved.

Sternum. Scutiform, longer than wide in ratio of 27 : 22; widest between second coxae; convex from anterior border with greatest convexity opposite interval between second and third coxae; anterior lateral corners strongly ridged; with an area about one third as wide as anterior border contiguous to ridged corners bevelled off to give the effect of very shallow depressions somewhat as in *Parahentzia mandibularis* Bryant ('43), but they are much less deeply excavated; posterior end bluntly bilobed and not extended between fourth coxae which are nearly contiguous. Anterior coxae much the stoutest.

Legs. 1423. Tibial index of first leg 16, of fourth leg 15.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	3.20	2.37	2.93	2.30	1.09	11.89
2.	2.50	1.54	1.60	1.85	.95	8.44
3.	2.43	1.34	1.36	1.79	.83	7.75
4.	2.94	1.47	1.92	2.05	.85	9.23
Palp	1.98	.76	.83	—	.95	4.52

All legs with a moderate supply of ordinary black hair; only first pair with a moderately well developed black ventral fringe beginning on retromargin of femora and continuing over tarsi.

Spines. First leg: femur dorsal 0–0–1–1–1 and prolateral distal 2; patella only prolateral 0–1–0; tibia only ventral 2–2–2, promarginal series occupying about the distal half of the segment, retromarginal series about the distal three fifths; metatarsus only ventral 0–2–2. Second leg: femur as in first; patella 0; tibia prolateral 0–1–0, ventral 0–1r–2–2; metatarsus as in first. Third leg: femur dorsal 0–1–1–1, prolateral distal 2, retrolateral distal 1; patella 0; tibia prolateral and retrolateral 0–1–0, ventral 0–0–2; metatarsus prolateral and retrolateral 0–2, ventral 0–2. Fourth leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 1; patella 0; tibia only retrolateral 0–0–1, ven-

tral 0–0–2; metatarsus prolateral and retrolateral 0–1, ventral 0–2. Palpal spines: apparently only femur prolateral distal 1, dorsal 0–0–1 (indicated by a scar); paratypes show considerable variation in these characters.

Palp. Femur strongly bent dorsoventrally. Tibia and patella of moderate length with the latter somewhat shorter than the former. Retrolateral tibial apophysis a stout spur bent ventrally in the middle to some extent. Bulb moderately swollen, nearly as broad as long; with small oval rugulose distal lobe from the retrolateral side of which a fairly long slender pointed spine (embolus) arises (Figs. 301–302).

Abdomen. Longer than wide in ratio of 38 : 23, widest about three sevenths of its length from base, much wider at base than at apex; anal tubercle with a tuft of white hairs; spinnerets as usual in the group; position of colulus indicated by a small tuft of stiff hairs; tracheal spiracle near base of spinnerets, with a distinct lip but no tubercle.

Color in alcohol. Carapace: generally a rich reddish brown with eyes on black spots; ventral part of lateral sides and steep declivity much darker; a small white spot made by the presence of lanceolate hairs between PLE; a broad ventrolateral stripe on each side from opposite interval between PME and PLE back to posterolateral corner. Chelicerae: a deep reddish brown with a striking degree of greenish iridescence. Sternum, lip, and maxillae a rich reddish brown without iridescence, the latter two with yellowish white tips. All legs reddish brown with femora very dark; first pair darkest; all with numerous lanceolate white hairs on dorsal surfaces and to some extent also laterally. Palp: light reddish brown throughout; femur with many white dorsal lanceolate hairs. Abdomen: dorsal area light brown covered with many scales which give it considerable iridescence; central part of dorsal area somewhat lighter than more lateral parts; four pairs of small white spots beginning at about one third from base and with last pair near posterior end; at each anterolateral corner there is a short white stripe and behind this on each side are two small white spots, the last one being just in front of the third dorsal pair of white spots; lateral sides brownish with very narrow yellowish stripes and a few iridescent scales; venter brown with an irregular row of yellowish dots bordering it on each side and enclosing a pair of somewhat obscure irregular yellowish dots near the center; genital groove bounded in front by a narrow brownish band in front of which the lung area is yellowish white except a central brownish stripe enclosing a pair of irregular yellowish spots.

Female allotype. Total length 8.32 mm. Carapace 4.10 mm. long, 3.71 mm. wide at level of PLE which occupy forty-three fifty-ninths of the width of carapace at their level, 2.56 mm. tall and, therefore, .69 as tall as wide; form essentially as in male except that angularity is toned down in the female; other features essentially as in male.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one tenth of the diameter of ALE. Posterior row wider than anterior row in ratio of 44 : 37, wider than middle row in ratio of 44 : 35. Quadrangle of laterals wider than long in ratio of 11: 7. Total eye space occupies about seven thirteenths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 32 : 16 : 3 : 15. AME separated from one another by one eighth of their diameter, from ALE by three sixteenths of their diameter. Middle eyes closer to ALE than to PLE in ratio of 10 : 17. Height of clypeus equal to one fourth the diameter of AME. Clypeus decorated as in male except that all bristles are light yellowish except the brownish medians.

Chelicerae. Parallel, vertical, robust; swollen in front; basal half of basal segment covered with yellowish lanceolate hairs; with long yellowish bristles along medial surface; distal half rugulose and greenish iridescent; basal segment 1.92 mm. long; with a broad smooth area contiguous to basal boss. Fang robust, especially in basal half, evenly curved. Fang groove with two ordinary promarginal teeth and a single simple retromarginal tooth of moderate size.

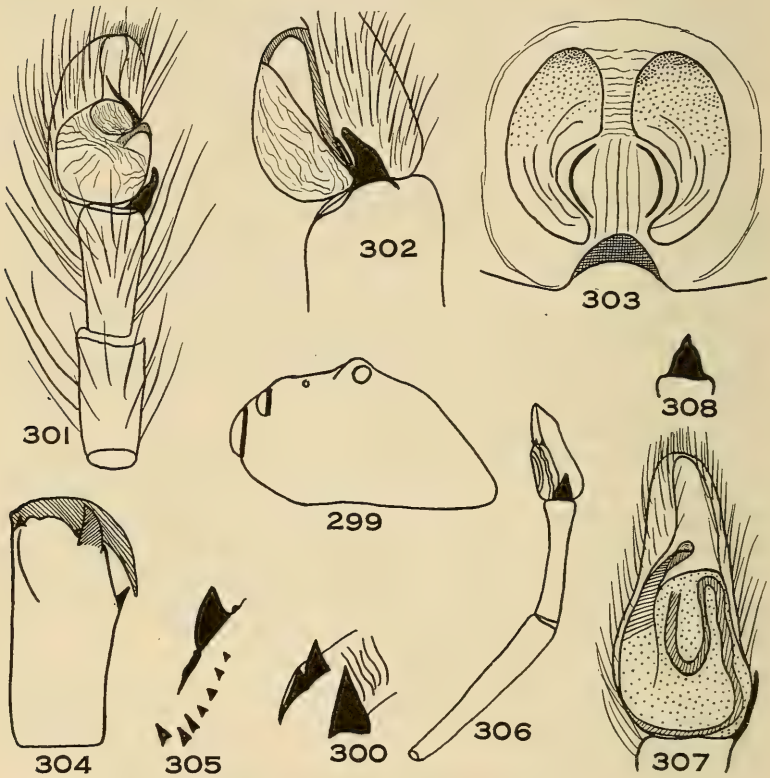
Maxillae and *Lip.* Essentially as in male.

Sternum. Essentially as in male except that the ridged margin at anterolateral corners is much reduced and the bevelled contiguous areas are lacking.

Legs. 1423. Tibial index of first leg 19, of fourth leg 15.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.69	1.92	2.18	1.60	.96	9.35
2.	2.24	1.47	1.32	1.34	.77	7.14
3.	2.30	1.32	1.15	1.41	.77	7.05
4.	2.88	1.54	1.86	1.92	.77	8.97

All legs with a moderate supply of yellowish hair, iridescent scales and long and short black bristles. First pair of legs with a distinct fringe much as in male; hairs on patellae, proximal ends of tibiae and metatarsi yellowish white, elsewhere black. Palps with many yellowish white erect hairs.



External Anatomy of Spiders

Fig. 299. *Parnaenus recurvus* Chickering; male carapace, lateral view.
Fig. 300. *P. recurvus* Chickering; male cheliceral teeth.
Figs. 301–302. *P. recurvus* Chickering; male palp, ventral view; and parts of palpal tibia and tarsus, retrolateral view, larger scale.
Fig. 303. *P. recurvus* Chickering; epigynum, ventral view.
Figs. 304–305. *Amycus peckhami* Chickering; male chelicera, front view and cheliceral teeth.
Figs. 306–308. *A. peckhami* Chickering; male palp, palpal tibia and palpal tibial apophysis.

Spines. First leg: as in male except patella 0. Second leg: femur and metatarsus as in male; patella prolateral 0–1–0 on right but 0 on left; tibia as in male on left side but 1r–1r–2 on right. Third and fourth as in male. Palpal spines: only femur dorsal 0–1.

Abdomen. As in male.

Epigynum. Posterior margin broadly but not deeply notched; notch appears to open into a chamber; anterior two thirds contain two elongated cavities separated by a flask-shaped septum (Fig. 303).

Color in alcohol. Carapace: light brown with many yellowish lanceolate hairs; eyes on black spots; lateral sides and steep posterior declivity somewhat darker; concentrations of the yellowish lanceolate hairs mark out somewhat indefinitely the two posterolateral stripes so conspicuous in male. Chelicerae light brownish with distal halves much darker and iridescent. Sternum brownish, much streaked and irregularly spotted with dark brown. Lip and maxillae dark brown with yellowish white tips. Legs: first pair light yellowish brown with femur darker except the distal end, tibia also darker; other legs yellowish white with pale reddish brown markings the most definite of which are at distal ends of femora, patellae, and tibiae especially the fourth. Palps yellowish white. Abdomen: dorsal area somewhat as in male, central light stripe more definite and stripes lateral to this are much darker and more definite; four pairs of dorsal white spots occur but last pair is joined to lateral yellowish spots; base is dark brownish below a yellowish basal band which continues dorsolaterally as a yellowish stripe and joins the first of a series of three large yellowish spots the last of which lies close to posterior end; lateral sides as in male; venter as in male except the rows of dots are much more definite and larger, especially the central ones which unite to make two rather conspicuous stripes; thus the venter has a narrow central brown stripe, then a pair of yellowish stripes, a pair of brown stripes and two borders of yellowish dots.

Type locality. Male holotype and female allotype from Canal Zone Biological Area, July, 1936. Paratypes of both sexes from: Canal Zone Biological Area, June–July, 1934; July, 1936; June–Aug., 1939; Jan.–Feb. 1940; El Valle, R. P., July, 1936; C. Z. Forest Reserve, C. Z., Aug., 1939; El Cermeno, R. P., Jan.–Feb., 1940.

Genus Phidippus C. Koch, 1846

Although it seems unlikely that Phidippus occurs in Panama the genus must be included here because of F. Cambridge's records. Only

one of his species is definitely recorded from Panama though another, *P. carneus* Peckham, is recorded from Central America without specific locality.

Phidippus aureopilosus F. Cambridge, 1901

P. aureopilosus Petrunkevitch, 1911
P. aureopilosus Petrunkevitch, 1925

It seems to me probable that this species, known only from females, belongs with males either unknown or assigned to the genus Paraphidippus or Parnaenus. Cambridge had these from Bugaba, R. P., but they have not yet appeared in my collection.

Amycus Group

Key to the genera of the Amycus Group

1. First pair of tibiae with four pairs of ventral spines; first pair of metatarsi with three pairs of ventral spines. Chelicerae: often greatly produced in male; retromargin of fang groove with two teeth or with a single fissidentate tooth (female). Height of clypeus less than half the diameter of AME. *Cobanus*, (p. 357)
1. Not with combination of characters given above.....2
2. First pair of tibiae with three pairs of ventral spines; first pair of metatarsi with two pairs of ventral spines; both sets distributed in usual manner. Chelicerae: often considerably produced in males; retromargin of fang groove with several teeth. Height of clypeus more than a full diameter of AME (except in spiralifer where it is little more than half a diameter of AME) *Amycus*, (p. 346)
2. First pair of tibiae with three pairs of ventral spines, but two pairs crowded into distal third, first pair near proximal end; first pair of metatarsi with two pairs of ventral spines. PLE elevated on prominent tubercles. Chelicerae; often somewhat produced and excavated medially in males; retromargin of fang groove with several teeth. Height of clypeus equal to more than a full diameter of AME in males, but less than half a diameter in females..... *Titanattus*, (p. 383)

Genus Amycus C. Koch, 1846

Petrunkevitch ('25) included seven species of Amycus in his list of those probably occurring in Panama. *Amycus pacatus* Peckham was simply reported from Central America without specific locality. Cam-

bridge had suspicions that *A. pacatus* and *A. hieroglyphicus* Peckham were the same. The type of *A. pacatus* is not now present in the Peckham collection, but I have studied the type of *A. hieroglyphicus* and I have drawn the tentative conclusion that they represent two distinct but closely related species. However, *A. pacatus* is not included here because of lack of definite record of its occurrence in Panama. I consider *A. palpinalis* F. Cambridge a synonym of *A. fallax* Peckham. Banks ('29) recorded four species of Amycus from the Canal Zone Biological Area, all recorded previously from Panama. I consider both of the males identified by Mr. Banks as *A. quadriguttatus* F. Cambridge to be *A. fallax* Peckham. The females are the same as I have included in *A. peckhami* sp. nov. I have two species which I consider new to science and I herewith give detailed descriptions of both. With the changes which I have indicated, the list of species of Amycus now known to occur in Panama may be listed as follows: *A. benignus* (Peckham), *A. fallax* Peckham, *A. hieroglyphicus* Peckham, *A. peckhami* sp. nov., *A. quadriguttatus* F. Cambridge, *A. spiralifer* F. Cambridge, and *A. zeteki* sp. nov.

Key to the species of Amycus from Panama

Males

1. Chelicerae with a prominent hook at middle of outer margin of basal segment. Clypeus only a little more than half as high as diameter of AME. Palp: patella and tibia short; embolus long, spiraloid, encircling the bulb— *A. spiralifer*, (p. 354)
1. Not with combination of characters given above 2
2. Clypeus without a white spot, nearly all dark brown, especially ventral half. Palp: patella longer than tibia, exclusive of apophysis, in ratio of about 3 : 2; tibia about as long as tarsus; tarsal spine (embolus) long, slender, ungrooved, distally expanded and notched..... *A. fallax*, (p. 349)
2. Not with combination of characters given above 3
3. Clypeus without central white spot, light colored. Palp: tibia and patella about equal in length, both short; tarsus longer than either tibia or patella in ratio of about 5 : 3; tarsal spine (embolus) long, slender, curving from base of bulb to anterior end where it is distinctly aculeate ..... *A. benignus*, (p. 348)
3. Not with combination of characters given above 4
4. Clypeus with a central white brush, black in ventral half. Palp: patella longer than tibia, exclusive of apophysis, in ratio of nearly 2 : 1; patella longer than tarsus in ratio of about 8 : 7; tarsal spine (embolus) stout, grooved ventrally from near its origin which is near middle of bulb on prolateral side..... *A. hieroglyphicus*, (p. 349)

4. Not with combination of characters given above.....5
5. (Taken from Cambridge's work) Clypeus without a central white spot. Palp: patella nearly as long as tibia and tarsus together; tibia and tarsus about equal in length; tarsal spine (embolus) slender, ungrooved from its origin on prolateral side of bulb near distal end to its aculeate tip.....
A. quadriguttatus, (p. 354)
5. Not with combination of characters given above.....6
6. Clypeus with a central white brush, black in ventral half. Palp: patella longer than tibia, exclusive of apophysis, in ratio of about 5 : 3; tibia and tarsus about equal in length; tarsal spine (embolus) stout, grooved from near its origin which is near middle of bulb on prolateral side .....
A. zeteki, (p. 355)
6. Clypeus with a central white brush which reaches nearly to ventral border. Palp: patella and tibia both long; patella longer than tibia in ratio of about 3 : 2; tibia longer than tarsus in ratio of about 16 : 13; tarsal spine (embolus) arises near middle on prolateral side, moderately stout, grooved only near distal end..... *A. peckhami*, (p. 349)

Females

I have shown that the female considered by the Peckhams to belong with the males of *A. fallax* is really a Cobanus. F. Cambridge thought it highly probable that the female which the Peckhams placed with males of *A. hieroglyphicus* belongs with his *A. quadriguttatus*. I have numerous females so far unplaced and I am reasonably certain only of the females of *A. benignus* and *A. peckhami* sp. nov. In view of the great uncertainty regarding females no attempt will be made to separate them by means of a key until further knowledge is available.

Amycus benignus (Peckham), 1885

Triptolemus benignus Peckham, 1885
A. benignus Peckham, 1896
A. benignus F. Cambridge, 1901
A. benignus Petrunkevitch, 1911
A. benignus Petrunkevitch, 1925
A. benignus Banks, 1929
Lyssomonea saphes Chamberlin and Ivie, 1936

A. marjori is not now in the Peckham collection in the Museum of Comparative Zoölogy and is probably lost. I have no doubt, however, that the males described under this name belonged to *A. benignus*, as first pointed out by F. Cambridge, but the females were something else entirely different. I have the species from the following localities: Canal Zone Biological Area, June–July, 1934; July, 1936; June–Aug.,

1939; Ft. Davis, C. Z., Aug., 1936; Porto Bello, R. P., Aug., 1939.

Amycus fallax Peckham, 1896

A. fallax F. Cambridge, 1901
A. palpinalis F. Cambridge, 1901
A. fallax Petrunkevitch, 1911
A. palpinalis Petrunkevitch, 1911
A. fallax Petrunkevitch, 1925
A. palpinalis Petrunkevitch, 1925

The single figure of the male palp of *A. fallax* Pk. served only to show the tibial apophysis but not the important features of the tarsus. I have carefully examined the Peckham types and compared them with what is generally conceded to be *A. palpinalis* F. Camb. The characters of the tibia and the tarsus are so unmistakable that I believe it safe to establish the synonymy as it is given above. Apparently Cambridge did not see the peculiar bifurcation at the tip of the embolus in his *A. palpinalis*. It is very clear under a good light and is well brought out in Petrunkevitch's figures ('25). The single female mentioned in the Peckhams' description of *A. fallax* is a Cobanus but I have been unable to place it specifically. Its generic characters are clear and definite. This species is in my collection from the following localities: Canal Zone Biological Area, June–July, 1936; June–Aug., 1939; Madden Dam region, C. Z., Aug., 1936. Both of Mr. Banks' males from the Canal Zone Biological Area labelled A. quadriguttatus belong to this species. The females probably go with *A. peckhami* sp. nov.

Amycus hieroglyphicus Peckham, 1896

A. hieroglyphicus F. Cambridge, 1901
A. hieroglyphicus Petrunkevitch, 1911
A. hieroglyphicus Petrunkevitch, 1925

This species appears in my collection only from the Canal Zone Biological Area, July, 1936; July–August, 1939.

Amycus peckhami spec. nov.

Figs. 304–310

Male holotype. Total length 6.78 mm. Carapace 2.88 mm. long, 2.11 mm. wide at level of third eyes where it is widest and where eyes

occupy almost three fourths the width of the carapace; well rounded along lateral sides; longitudinal thoracic groove begins between PLE; with numerous bristles but none which seems to be particularly significant. Carapace tall in true Amycus style, almost exactly as tall as wide (in some paratypes not quite as tall); with a prominent crest of dark reddish hairs between ALE, procumbent in middle, erect at lateral ends; a line at some distance from ventral margin extends from posterior border to lateral regions of clypeus.

Eyes. Seen from in front, anterior row strongly recurved. Anterior row and posterior row equally wide, middle row not quite six sevenths as wide as others. Quadrangle of laterals about five sevenths as long as wide. Total eye space occupies about five ninths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 26 : 12 : 4 : 13. AME separated from one another by one thirteenth of their diameter, from ALE by three twenty-sixths of their diameter. Eyes of second row closer to ALE than to PLE in ratio of 7 : 10. Clypeus somewhat slanting forward. Height of clypeus equal to forty-five twenty-sixths of the diameter of AME..

Chelicerae. Essentially parallel, vertical; considerably produced; slightly widened opposite the promarginal tooth near medial end of fang groove; basal segment 1.30 mm. long; somewhat flattened distally on prolateral surface (Fig. 304); with a low outer ridge at distal end of which is a short tooth. No boss visible. Fang robust, finely serrated along inner border. Promargin of fang groove with a very robust tooth near base of fang, a small tooth at the base of the fang, and a tooth of moderate size at inner end of groove, and also a cusp just medial to the large tooth; the retromargin with a row of six small teeth increasing in size from near base of fang to inner end of groove (Fig. 305). Some variation noted among paratypes in respect to retromarginal teeth, more in respect to relative size than in number, however.

Maxillae. Essentially parallel; longer than wide in middle in ratio of almost 9 : 4; very concave along outer border; markedly drawn out into distal angle; with a well developed silky scopula along truncature; slightly excavated contiguous to lip.

Lip. Longer than wide in ratio of 14 : 11; distal border very convex and much rounded; with a cluster of long stiff bristles not arranged in a row; basal excavations reach about one third of length of organ; basal third with cross striations and somewhat less ventral convexity than in distal two thirds.

Sternum. Longer than wide in ratio of about 25 : 21; with a strongly

chitinized complete margin; widest between third coxae; very blunt at posterior end and not extended between fourth coxae which are separated by about three fifths of their width; quite convex; covered by numerous long slender bristles.

Legs. 3142. Tibial index of first leg 11, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.37	1.13	1.87	1.34	.65	7.36
2.	2.00	1.17	1.28	1.26	.64	6.35
3.	2.75	1.02	1.73	1.60	.77	7.87
4.	2.13	.77	1.34	1.60	.70	6.54
Palp	1.73	1.54	1.09	—	.82	5.18

First leg somewhat the stoutest. With no fringes.

Spines. First leg: femur dorsal 0–1–1–1, prolateral 0–0–2, retrolateral 0–0–1; patella only ventral 0–1r–0, and this is probably only an occasional feature; tibia only prolateral 1–1–1, ventral 2–2–2; metatarsus only ventral 2–2 (proximal pair half as long as segment). Second leg: femur dorsal same as first except retrolateral 0–0–2; patella 0; tibia same as first except ventral 1r–2–2; metatarsus same as first. Third leg: femur dorsal 0–1–1–1, prolateral 0–1–2, retrolateral only distal 1; patella only retrolateral 0–1–0; tibia prolateral 0–1–1–0, retrolateral 1–1–1, ventral 1p–0–1r; metatarsus prolateral 1–2, retrolateral 1–1, ventral 2–2. Fourth leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 1; patella as in third; tibia only retrolateral 0–1–1–1, ventral 0–0–1r; metatarsus prolateral and retrolateral 1–1, ventral 0. Considerable variation has been noted between the two sides of the same animal as well as among paratypes.

Palp. Long and slender, femur nearly straight. Tibial apophysis a stout spur much like that in *A. zeteki* sp. nov. and others. Tarsal spine fairly stout, arises distal to middle of prolateral side of bulb, curves retrolaterally very gradually, not geniculate, grooved only near distal end (Figs. 306–308).

Abdomen. Slender, longer than wide in ratio of 11 : 5; widest near base, tapers gradually to posterior end; anal tubercle a short broad cone. Spinnerets all slender, anterior pair somewhat the most robust, middle pair and posterior pair about equally slender and in a transverse row. Four dorsal sigilla small and obscure. Colulus fairly clear and visible as a small cone with a tuft of light colored bristles. Tracheal spiracle near base of spinnerets.

Color in alcohol. One of the more deeply colored species. Legs:

first femora dark brownish except the yellowish dorsal proximal halves of segment; second and third femora yellowish with brownish distal thirds; fourth femora yellowish, only darkened at extreme distal ends; other segments more or less indefinitely darkened; underparts generally lighter. Palps yellowish with darker tarsi. Chelicerae a deep amber. Carapace generally a reddish amber; with a dark irregular marginal line, widened in ventral part of clypeus; a large, snow white, somewhat triangular hairy spot in center of clypeus; between ALE and PLE is a large white spot; just anterior to thoracic groove is a small white spot and just behind the groove is another much larger white spot possibly connected with the small one in unrubbed specimens. Abdomen: with a dark base which extends dorsolaterally on each side as a broad, dark brown, almost black stripe; just posterior to dark base is a white transverse dorsal band which is continuous with a central white stripe to anal tubercle; venter with a central broad dark stripe, somewhat narrowed posteriorly; laterally abdomen is yellowish. Color is highly variable in all of the members of the genus. In some specimens the abdominal stripes are broken into small spots; in others reduced to narrow and shorter stripes. Not much dependence can be placed upon color patterns as a guide to identification.

Female allotype. Total length 6.06 mm. Carapace 2.43 mm. long, 1.86 mm. wide opposite PLE which occupy slightly more than three quarters of the width of carapace at that level, 1.60 mm. tall and, therefore, about .86 as tall as wide; less rounded laterally than in male. Otherwise essentially as in male.

Eyes. Seen from in front, anterior row strongly recurved. Anterior row slightly wider than posterior row, middle row about five sixths as wide as first row. Quadrangle of laterals wider than long in ratio of 17 : 12. Total eye space occupies twenty-two thirty-sevenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 26 : 11 : 2.5 12. AME separated from one another by one twenty-sixth of their diameter, from ALE by three thirteenths of their diameter. Eyes of middle row closer to ALE than to PLE in ratio of 5 : 8. Clypeus not notably convex or slanted forward as in male; ventral margin with a shallow notch in middle; with three stiff bristles in lower angle between AME; with a narrow transverse band of white hairs passing through middle from side to side. Height of clypeus equal to eight thirds the diameter of AME.

Chelicerae. Moderately robust, parallel, vertical; not produced as in male; no boss visible. Fang moderately robust, evenly curved. Fang groove with three promarginal teeth of moderate size, two close to-

gether, the other isolated near medial end of groove; retromargin with five smaller teeth, increasing in size toward medial end of groove (Fig. 309).

Maxillae. Parallel; longer than wide in ratio of about 15 : 7; somewhat concave along outer border and somewhat dilated distally; not drawn out into lateral angles as in male, outer distal corner well rounded.

Lip. Longer than wide in ratio of 19 : 15; anterior border nearly straight, very slightly notched; basal third not striated as in male. Sternal suture gently procurved.

Sternum. Essentially as in male.

Legs. 3412. Tibial index of first leg 18, of fourth leg 15.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.66	.83	1.09	.84	.53	4.95
2.	1.60	.76	.99	.83	.45	4.63
3.	2.30	.83	1.19	1.08	.58	5.98
4.	1.81	.57	1.03	1.15	.58	5.11

Otherwise essentially as in male.

Spines. First leg: femur as in male except retrolateral 0; patella 0; tibia as in male except prolateral 1–0–1–0; metatarsus as in male. Second leg: femur as in first of male; patella 0; tibia only prolateral 1–0–1–0, ventral 1r–2–2; metatarsus as in male. Third leg: femur as in male except retrolateral 0; patella only retrolateral 0–1–0; tibia prolateral and retrolateral 1–1–1, ventral 1p–0–1r; metatarsus prolateral 1–2, retrolateral 1–1, ventral 2–1r. Fourth leg: femur only dorsal 0–1–1–1; patella only retrolateral 0–1–0; tibia only retrolateral 0–1–1, ventral 0–0–1r; metatarsus prolateral 0–2, retrolateral 1–1, ventral 1p–1r.

Abdomen. Ovoid, more robust than in male; longer than wide in ratio of 27 : 15; widest in basal fourth. Other features essentially as in male.

Epigynum. A broad, strongly chitinized central lip lies below a central opening; on each side near anterior margin appears a clear oval area (Fig. 310).

Color in alcohol. All appendages yellowish. Carapace: generally a light amber; all eyes on black spots except AME; a few white hairs between ALE; above AME and around all other eyes are many scale-like bright red hairs. Abdomen: generally yellowish white; with two

small dorsal black spots near base; with two narrow dorsal black stripes extending through posterior three fifths; and two small dark spots on venter just a short distance in front of base of spinnerets. This color pattern is highly variable among paratypes and very unreliable as a means of identification.

Type locality. Male holotype from Canal Zone Biological Area, July, 1936; female allotype from the same area, Aug., 1939. Many paratypes from the following localities: Canal Zone Biological Area, June–July, 1934; July–Aug., 1936; Aug., 1939; Balboa, C. Z., July, 1936; Porto Bello, R. P., Aug., 1936.

Amycus quadriguttatus F. Cambridge, 1901

A. quadriguttatus Petrunkevitch, 1911
A. quadriguttatus Petrunkevitch, 1925

I have two females from the Canal Zone Biological Area, Aug., 1936 and June, 1939, whose epigyna closely resemble those in this species described by F. Cambridge. There may be doubt about the correct placement of these specimens. Males have not yet appeared in my collection. I have commented on Banks' identification of this species on an earlier page.

Amycus spiralifer F. Cambridge, 1901

A. spiralifer Petrunkevitch, 1911
A. spiralifer Petrunkevitch, 1925
A. spiralifer Banks, 1929

This species is very unlike others from Panama. It has a relatively low clypeus; the order of legs is 1432; the palpal patella is short; the palpal tibia is short and broad; the palpal tarsus with its long coiled embolus is totally different from the others known to me; other less important differences are numerous. The species seems to occupy some such position in the genus Amycus as *Corythalia sulphurea* does in the genus Corythalia. It seems probable that it will be removed to another genus when this group is studied more carefully.

The species appears in my collections from the following localities: Canal Zone Biological Area, June–July, 1934; July–Aug., 1936; June–Aug., 1939; Porto Bello, R. P., Aug., 1936; Ft. Davis, C. Z., Aug., 1936; Madden Dam region, C. Z., Aug., 1939.

AMYCUS ZETEKI spec. nov.

Figures 311–315

Male holotype. Total length 7.45 mm. Carapace 3.35 mm. long, 2.69 mm. wide opposite PLE which occupy three fourths of the width of the carapace at that level, 2.31 mm. tall and, therefore, about five-sixths as tall as wide; well rounded along lateral sides; broad at posterior border; median longitudinal thoracic groove begins just in front of posterior border of PLE; with numerous bristles but a line of about eight below PLE seems to be characteristic; with a prominent crest of dark reddish hair between ALE.

Eyes. Seen from in front, anterior row strongly recurved. Anterior row only very slightly wider than posterior row, middle row nine elevenths as wide as anterior row. Quadrangle of laterals wider than long in ratio of about 3 : 2. Total eye space occupies almost exactly half the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 11 : 4.75 : 1.5 : 4.5. AME separated from one another by one thirty-second of their diameter, from ALE by one sixteenth of their diameter. Eyes of second row closer to ALE than to PLE in ratio of 7 : 12. Clypeus somewhat slanted forward, well rounded in front; height equal to twenty-three elevenths of the diameter of AME.

Chelicerae. Essentially parallel, vertical, considerably produced; gradually widened from base to opposite smaller of the promarginal teeth; basal segment 1.78 mm. long; much as in A. hieroglyphicus Peckham. If boss is present it is concealed. Fang robust, finely serrated along inner margin; prolateral surface considerably flattened, apparently where it moves against the large prolateral tooth. Promargin of fang groove with a very robust, flattened tooth about two fifths from base of fang and a small tooth near medial end of fang groove, a low ridge also extends from large tooth nearly to small one; retromargin of fang groove with a row of six teeth (five on right side) gradually increasing in size from opposite large tooth to near medial end of fang groove.

Maxillae. Longer than wide in middle in ratio of nearly 3 : 1; very strongly notched in middle of outer border; dilated distally and drawn out into a pronounced lateral angle; with well developed silky scopula along truncature; slightly excavated contiguous to lip.

Lip. Longer than wide in ratio of 36 : 25; distal border gently rounded; with a few long stiff bristles with outer ends procurved; basal quarter with cross striations; basal excavations reach about three sevenths of length of organ. Sternal suture mildly procurved.

Sternum. Longer than wide in ratio of 16 : 13; with a strongly chitinized complete margin; widest between intervals separating second and third coxae; very blunt posteriorly and not extended between fourth coxae which are separated by about one third of their diameter; moderately convex (Fig. 311).

Legs. 3124. Tibial index of first leg 13, of fourth leg 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.75	1.47	2.37	1.73	.70	9.02
2.	2.62	1.28	1.92	1.47	.70	7.99
3.	3.33	1.28	1.98	1.95	.90	9.44
4.	2.62	.83	1.57	1.86	.70	7.58
Palp	2.05	1.60	1.02	—	1.05	5.72

Legs with no fringes.

Spines. First leg: femur dorsal 0–1–1–1, prolateral distal 2, retrolateral distal 1; patella only prolateral 0–1–0; tibia only prolateral 1–1–1, ventral 2–2–2; metatarsus only ventral 2–2. Second leg: as in first except tibia ventral 1r–2–2. Third leg: femur dorsal 0–1–1–1, prolateral 0–0–1–2, retrolateral only distal 1; patella only retrolateral 0–1–0; tibia prolateral and retrolateral 1–1–1, ventral 0–lp–1r; metatarsus prolateral and retrolateral 1–0–2, ventral 2–2. Fourth leg: femur dorsal 0–1–1–1, prolateral and retrolateral 0–0–0–1; patella as in third; tibia prolateral and retrolateral 0–1–1–0; ventral 0–0–1r; metatarsus dorsal 1r–0–2, prolateral 1–0–1, ventral 0–0–1r.

Palp. Long and slender; femur nearly straight; patella longer than tibia in ratio of about 8 : 5; tarsus only slightly longer than tibia; tibial apophysis a stout spur; tarsal spine a stout, deeply grooved canal arising near middle of the prolateral side of bulb and extending nearly straight for first half and then bent toward retrolateral side where it terminates near the middle just beyond anterior border of bulb. This can hardly be the embolus which I believe to be hidden (Figs. 312–315).

Abdomen. Slender, longer than wide in ratio of 60 : 27, widest near or at base, blunt at posterior end. Spinnerets very slender, rather long anterior pair only slightly more robust, middle pair not concealed by others, middle and posterior pairs show from dorsal side in transverse row; four small sigilla near middle of dorsum; colulus represented by a small tuft of black bristles; tracheal spiracle near base of spinnerets.

Color in alcohol. All appendages various shades of amber, femora and tarsi lightest of all segments in legs. Carapace generally a rich amber, darker above, eyes on black spots; a prominent crest of dark reddish hairs between ALE; in the middle just behind the crest is a small white spot and farther back just at posterior end of longitudinal groove is another small white spot. The whole clypeal region has a striking color pattern: reddish amber above gradually becoming black below, just below interval between AME is a snow white, somewhat triangular spot. Abdomen: with a light colored base; a pale brownish dorsolateral stripe begins near base and continues to spinnerets; just beyond the middle the brownish stripe extends dorsally and is then separated from its mate on the opposite side by a narrow white median stripe; enclosed within the dorsal parts of the brownish dorsolateral stripes are two pairs of darker spots (in some specimens there are three pairs or they may all run together and merge with the stripe). Sternum and venter light yellowish.

Type locality. Male holotype from Canal Zone Biological Area, June, 1936. Two paratypes from the same locality, July, 1936.

Genus Cobanus F. Cambridge, 1900

F. Cambridge ('00) recognized four species of Cobanus from Panama as follows: *C. extensus* (Peckham), *C. flavens* (Peckham), *C. mandibularis* (Peckham), and *C. unicolor* F. Cambridge. Petrunkevitch ('25) reported *C. subfuscus* F. Cambridge from Panama and gave a detailed description of the male. Banks ('29) reported *C. extensus* (Pk.), *C. mandibularis* (Pk.), and *C. subfuscus* F. Cambridge, all from the Canal Zone Biological Area. The male identified by Mr. Banks as *C. extensus* (Peckham) I am obliged to consider a specimen of *C. electus* sp. nov. *C. erythrocras* Chamberlin and Ivie is very difficult to place properly among the species from this region because the important features are so incompletely described. In my study of this genus I have been compelled to recognize six new species from this region. We may, therefore, list the species now probably known from Panama as follows: *Cobanus cambridgei* sp. nov.; *C. bifurcatus* sp. nov.; *C. electus* sp. nov.; *C. erythrocras* Chamberlin and Ivie; *C. extensus* (Peckham); *C. flavens* (Peckham); *C. incurvus* sp. nov.; *C. mandibularis* (Peckham); *C. obscurus* sp. nov.; *C. seclusus* sp. nov.; *C. subfuscus* F. Cambridge; *C. unicolor* F. Cambridge.

Key to the species of Cobanus from Panama

Males

1. Palpal femur and sometimes also palpal patella with a dorsal crest of white hairs 2
1. Palpal femur and palpal patella without dorsal crest 6
2. Chelicerae usually moderately produced, with a large tooth on prolateral side near base of fang (suppressed in some individuals); palpal tarsus equal in length to palpal tibia; circle at distal end of bulb equal in diameter to one third of length of bulb ..... *C. electus*, (p. 369)
2. Not with combination of characters given above 3
3. Chelicerae highly variable; when produced, without any large tooth on prolateral side near base of fang; both femur and patella of palp with a well developed dorsal crest of white hair; palpal tarsus longer than palpal tibia in ratio of about 5 : 4; embolus distinctly bifurcate at tip ..... *C. bifurcatus*, (p. 364)
3. Not with combination of characters given above 4
4. Usually with chelicerae not much produced, sometimes strongly so; without tooth on prolateral side near base of fang; palpal femur with a snow white dorsal crest which continues only slightly onto patella; diameter of circle at distal end of bulb almost half as long as bulb ... *C. cambridgei*, (p. 360)
4. Not with combination of characters given above 5
5. Chelicerae probably highly variable, but typically strongly developed; without tooth at base of fang on prolateral side; palpal femur only with white dorsal crest; palpal tarsus shorter than palpal tibia in ratio of about 8 : 9; palpal tibial apophysis with a beak-like tip; diameter of circle at distal end of bulb about two fifths as long as bulb .... *C. extensus*, (p. 374)
5. Chelicerae typically strongly produced; with a large tooth on prolateral side at base of fang; probably both femur and patella of palp with white dorsal crest; palpal tarsus about equal in length to that of palpal tibia; palpal tibial apophysis a slender, nearly straight, divergent spur; diameter of circle at distal end of bulb only about one fourth as long as bulb ..... *C. erythrocras*, (p. 374)
6. Chelicerae usually strongly produced; with a large tooth on prolateral side near base of fang; fang with a tooth on inner margin; palpal tarsus slightly longer than palpal tibia ..... *C. mandibularis*, (p. 377)
6. Not with combination of characters given above 7
7. Chelicerae not usually strongly produced, but perhaps variable; embolus cleft almost to its base ..... *C. subfuscus*, (p. 382)
7. Not with combination of characters given above 8
8. Chelicerae usually strongly produced; retromarginal teeth near together, fairly close to base of fang; palpal tibia longer than palpal patella in ratio of about 4 : 3, tarsus only slightly longer than tibia ... *C. unicolor*, (p. 382)

8. Chelicerae usually not strongly produced; embolus accompanied by a second spine close to cymbium; tibial palpal apophysis terminate in two sharp points; palpal tibia only slightly longer than palpal patella; palpal tarsus longer than palpal tibia in ratio of about 5 : 4.. *C. flavens*, (p. 374)

Females

It is very difficult to make a good key for use with the females of Cobanus. I have been compelled to use characters which are somewhat obscure, but they are the best I can find.

1. Epigynal plate completely divided into halves, nearly twice as wide as long; large spermathecae with long axis parallel to long axis of body, close together in center; openings near small excurved lines which occur close to middle of each half of plate..... *C. cambridgei*, (p. 360)
1. Not with combination of characters given above.....2
2. Epigynal plate incompletely divided into halves, considerably less than twice as wide as long; large spermathecae with long axis transverse to long axis of body, close together but nearer posterior border; openings near diagonally placed lines in anterior part of plate..... *C. bifurcatus*, (p. 364)
2. Not with combination of characters given above.....3
3. Epigynal plate completely divided into halves, about two thirds as long as wide; with spermathecae smaller and at posterolateral corners of plate, associated with more medial tubules; openings along obliquely placed, curved lines which also lie near posterolateral corners.. *C. electus*, (p. 369)
3. Not with combination of characters given above.....4
4. Epigynal plate about two thirds as long as wide, with a distinct anterior margin; spermathecae partly divided, lying partly outside of lateral boundaries of plate; openings near lines which lie near lateral margins of plate and parallel to long axis of body..... *C. obscurus*, (p. 377)
4. Not with combination of characters given above.....5
5. Epigynal plate about nine elevenths as long as wide, completely divided; large spermathecae at posterolateral corners of plate and partly outside of its boundaries; openings near lines which lie diagonally at posterolateral corners of plate ..... *C. incurvus*, (p. 375)
5. Not with combination of characters given above.....6
6. Epigynal plate almost exactly two thirds as long as wide, completely divided into halves; large spermathecae far apart and slightly outside of plate; openings near short, irregular lines which lie close to posterior border of plate, fairly close to center..... *C. seclusus*, (p. 380)
6. Epigynal plate wider than long in ratio of about 3 : 2, completely divided and with anterior margin; each large spermatheca near center of its own half of plate; openings near obliquely placed, curved lines which connect with anterior boundaries..... *C. flavens*, (p. 374)

COBANUS CAMBRIDGEI spec. nov.

Figures 316–321

Male holotype. Total length 4.58 mm. Carapace 2.43 mm. long, 1.79 mm. wide opposite third row of eyes which occupy seventy-three eightieths of width of carapace at their level; interocular region slightly convex; rises considerably from AME to just in front of PLE, then descends gently to a little behind median longitudinal thoracic groove and then steeply to posterior border; having the usual form for the genus; with no tufts of hair on cephalic area.

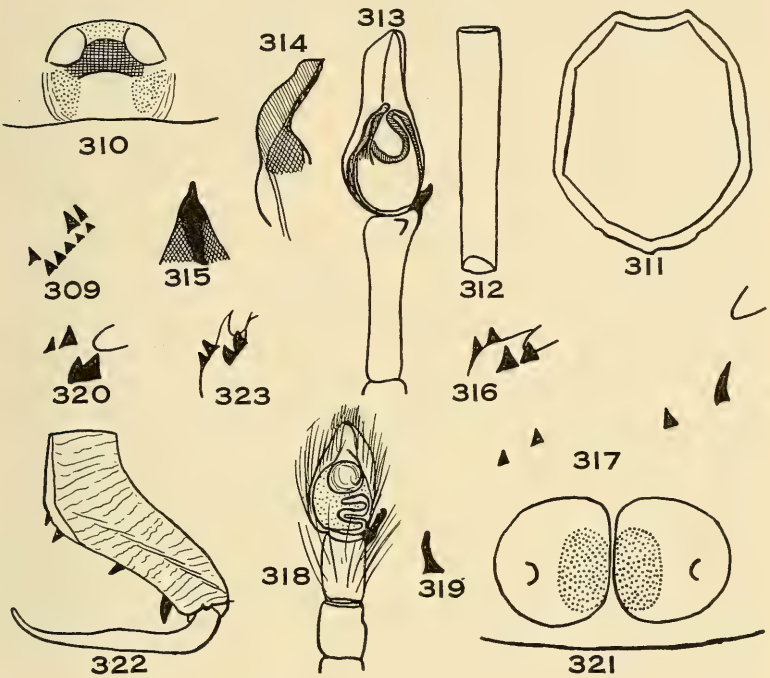
Eyes. Seen from in front, anterior row recurved so that a line from dorsal borders of AME cuts off about the dorsal fourth of ALE. Anterior row longer than posterior row in ratio of 78 : 73. Middle row shorter than posterior row in ratio of 70 : 73. Quadrangle of laterals wider than long in ratio of 39 : 22. Total eye space occupies eighteen thirty-sevenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 24 : 14 : 4 : 13.5. AME separated from one another by one twentieth of their diameter, from ALE by one tenth of their diameter. Middle eyes closer to PLE than to ALE in ratio of 10 : 17. Height of clypeus equal to one fourth the diameter of AME.

Chelicerae. Nearly parallel, nearly vertical; fairly robust but not much produced; basal segment .67 mm. long; with no basal boss visible. Fang slender and evenly curved. Fang groove with two rather small promarginal teeth and two somewhat larger retromarginal teeth (Fig. 316). Considerable variation noted among paratypes in respect to degree of development of chelicera. When considerably developed cheliceral teeth have appearance shown in Fig. 317.

Maxillae. Parallel; moderately concave along outer border; considerably dilated distally; longer than wide in middle in ratio of 28 : 15; outer distal corner well rounded; with well developed scopula along truncature; not excavated contiguous to lip.

Lip. Wider at base than long in ratio of about 6 : 5; basal excavations reach about one third of length of organ; narrowed from distal ends of excavations to distal end which is slightly less than one third as broad as base. Sternal suture slightly procurved.

Sternum. Generally scutiform; widest opposite interval between first and second coxae, almost as wide between second and third; longer than wide in ratio of 15 : 11; faintly and narrowly margined; quite convex especially in middle third; posterior end blunt and not extended between fourth coxae which are separated by five seventeenths of their width.



External Anatomy of Spiders

Fig. 309. *Amycus peckhami* Chickering; female cheliceral teeth.
Fig. 310. *A. peckhami* Chickering; epigynum, ventral view.
Fig. 311. *A. zeteki* Chickering; sternum.
Figs. 312–315. *A. zeteki* Chickering; male palp: patella; tibia and tarsus, ventral view; tarsal spine and tibial apophysis, larger scale.
Figs. 316–317. *Cobanus cambridgei* Chickering; male cheliceral teeth of holotype and paratype.
Figs. 318–319. *C. cambridgei* Chickering; male palp, ventral view; and tibial apophysis, retrolateral view.
Fig. 320. *C. cambridgei* Chickering; female cheliceral teeth.
Fig. 321. *C. cambridgei*, Chickering; epigynum, ventral view.
Figs. 322–323. *C. bifurcatus* Chickering; male chelicera of holotype and cheliceral teeth of male paratype.

Legs. 1432. Tibial index of first leg 14, of fourth leg 12.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.73	.90	1.41	1.09	.70	5.83
2.	1.30	.72	1.02	.83	.63	4.50
3.	1.73	.77	1.02	1.21	.57	5.30
4.	1.66	.70	1.08	1.22	.57	5.30
Palp	.71	.33	.40	—	.55	1.99

First leg most robust, femur not notably enlarged as in C. electus sp. nov.

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral only distal 1; elsewhere 0; patella only prolateral 0–1–0; tibia prolateral 1–0–1 on left side (0–1–0 on right), retrolateral 0–1–0, ventral 2–2–2–2 (second and third on promargin offset and staggered); metatarsus prolateral and retrolateral 0–0–1, ventral 2–2–2. Second leg: femur as in first except retrolateral distal 1; patella as in first; tibia only prolateral 1–1–0, ventral 2–1r–2–2; metatarsus prolateral 0–0–1, retrolateral 0–0–2, ventral 2–2–2 (second pair offset laterally). Third leg: femur as in second; patella only retrolateral 0–1–0; tibia prolateral and retrolateral 1–1–1, ventral 1p–0–2; metatarsus prolateral 1–0–2, retrolateral 1–1–0–2, ventral 0–2–2. Fourth leg: femur as in third; patella only prolateral 0–1–0, retrolateral 0–1–0; tibia prolateral 0–1–1, retrolateral 1–1–1, ventral 1p–0–2; metatarsus prolateral and retrolateral 1–1–2, ventral 1p–0–2. Palpal spines apparently 0.

Palp. Both patella and tibia short; tibia longer than patella in ratio of about 18 : 13; tarsus longer than tibia in ratio of about 25 : 18; femur with a snow white crest over distal three fifths of dorsal surface which continues slightly onto patella; tibial apophysis a single simple spur, somewhat twisted; diameter of circle at distal end of bulb almost half as great as length of bulb (Figs. 318–319).

Abdomen. Small in proportion to size of cephalothorax. Generally scutiform; longer than wide in ratio of 33 : 20, widest about the middle, fairly broad at base; spinnerets as usual in the genus; position of colulus indicated by a group of about seven black bristles; tracheal spiracle near base of spinnerets, guarded by a low tubercle bearing a black spot and a cluster of many stiff bristles which suggests the spiracular lobe found in other genera by O. Cambridge ('98), Chickering, ('37), and Bryant ('40) in Agobardus. Some species of Cobanus have this tubercle while others do not. *C. unicolor* is one which has it.

Color in alcohol. Chelicerae, maxillae, and sternum all with variable shades of light amber color. Palps light brownish above, light amber below, except the snow white crest on femur as already noted. First leg: patella and tarsus yellowish; femur, tibia, and metatarsus amber with prolateral and retrolateral surfaces of femur distinctly reddish, no white prolateral patch on patella, brownish annulations at patellar-tibial joint. Second leg like the first except lighter. Third and fourth legs light amber with dark annulations at patellar-tibial joints and at both ends of metatarsus. Carapace a bright reddish amber, somewhat lighter low on the sides, with eyes on connected black spots. Coxae and sternum light amber. Abdomen light yellowish at base; a somewhat broken median yellowish stripe embracing several dark chevrons in posterior half; a broken brownish stripe on each side of median light one; lateral sides yellowish with brownish streaks; venter generally yellowish bordered laterally by a narrow broken brownish stripe, in region of spiracular tubercle is a brownish band.

Female allotype. Total length 5.44 mm. Carapace 2.30 mm. long, 1.66 mm. wide at level of third row of eyes which occupy seventy-two seventy-sevenths of width at that level; of usual Cobanus form; highest in region of PLE where it is 1.26 mm. tall and, therefore, about three fourths as tall as wide. Short median longitudinal thoracic groove as usual in the genus.

Eyes. Anterior row recurved so that a line from dorsal borders of AME cuts off about one seventh of the diameter of ALE. Anterior row longer than posterior row in ratio of 75 : 72. Total eye space occupies almost three fifths of the length of carapace. Ratio of eyes AME : ALE : PME : PLE = 24 : 15 : 3 : 14. Otherwise essentially as in male.

Chelicerae. Fang groove with two promarginal teeth as in male; a single relatively large fissidentate tooth representing two of the male teeth fused (confirmed in paratypes). Otherwise essentially as in male (Fig. 320).

Maxillae, Lip, and *Sternum.* Essentially as in male.

Legs. 4312. Tibial index of first leg 19, of fourth leg 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.30	.70	.89	.77	.45	4.11
2.	1.21	.74	.75	.74	.45	3.89
3.	1.47	.76	.90	.96	.51	4.60
4.	1.53	.65	.96	1.22	.53	4.89

Spines. First leg: as in male except tibia only prolateral 1–1–0, ventral 2–2–2 (offset as in male)–2. Second leg: femur as in first except prolateral and retrolateral distal 1; patella only prolateral 0–1–0; tibia as in male; metatarsus prolateral and retrolateral 0–0–1, ventral 2–2–2 with second pair offset dorsally. Third leg: femur as in second of male; patella prolateral and retrolateral 0–1–0; tibia prolateral and retrolateral 0–1–1, ventral 0–1p–2; metatarsus dorsal 1–0, prolateral and retrolateral 1–2, ventral 2–2. Fourth leg: femur only dorsal 0–0–1–1–1, retrolateral distal 1; patella as in third; tibia prolateral 0–1–1, retrolateral 1–1–1, ventral as in third; metatarsus prolateral and retrolateral 1–1–2, ventral 1p–1 in middle.

Abdomen. Much more robust than in male; ovoid, longer than wide in ratio of 50 : 33, widest near middle; spiracular tubercle present but much smaller than in male. Otherwise as in male.

Epigynum. Of usual pattern; wider than long in ratio of nearly 2 : 1; spermathecae large and close together centrally (Fig. 321); openings near small excurved lines which occur near middle of each half of plate.

Color in alcohol. All appendages yellowish, with faint annulations on most legs, somewhat darker above. Carapace very similar to that of male, with an additional light streak from thoracic groove to posterior border. Abdomen like that of male except the color is darker and the pattern somewhat more definite; color spread over greater area on venter with mottling and broken stripes.

Paratypes. Among the male paratypes are some which show much elongated front legs and greatly produced chelicerae. These paratypes should be carefully studied.

Type locality. Male holotype, female allotype, several male paratypes, two female paratypes from Boquete, R. P., July, 1939.

Cobanus bifurcatus spec. nov.

Figures 322–325

This is another species in which the secondary sexual characters of males vary widely. I have males with nearly normal chelicerae and others with strongly produced basal segments while still others are intermediate in various degrees. Those with well developed secondary characters seem to be the most common in this species and, for this reason, the holotype male is selected from among this group.

Male holotype. Total length 5.70 mm. Carapace 2.69 mm. long,

2.30 mm. wide at level of interval betewen PME and PLE where a mild bulge occurs; somewhat convex between PME and only slightly depressed between PLE which occupy nearly nine tenths of width at that level; no tufts of hair on cephalic area, but reddish scale-like hair lies around all eyes, especially AME; 1.79 mm. tall and, therefore, a little more than three fourths as tall as wide; rises considerably to highest point opposite interval between second and third row of eyes, then gently arches to posterior declivity which begins at a small irregular white spot; all coxae plainly visible from above; a short median longitudinal thoracic groove as usual in the genus.

Eyes. Seen from in front, anterior row of eyes recurved so that a straight line from dorsal borders of AME cuts off about one eighth of the dorsal part of ALE. Anterior row only slightly wider than posterior row. Middle row shorter than posterior row in ratio of 83 : 89. Quadrangle of laterals wider than long in ratio of about 3 : 2. Total eye space occupies about ten seventeenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 30 : 17 : 4.5 : 17. AME separated from one another by one fifteenth of their diameter, from ALE by one tenth of their diameter. Middle eyes closer to PLE than to ALE in ratio of 4 : 5. Height of clypeus equal to one fifth the diammeter of AME. No special decorations on clypeus, the usual three bristles in lower angle between AME present.

Chelicerae. Strongly produced; very divergent after the first fourth; somewhat porrect; finely and transversely rugulose; with a shallow irregular groove extending diagonally across prolateral surface; fang long, slender, very sinuous. Promargin of fang groove with a very low tubercle but no tooth near base of fang, two small teeth near inner end of groove; two retromarginal teeth, one large and curved near base of fang, the other small and near middle; with no boss visible (Fig. 322). The paratype males with only slightly developed chelicerae have teeth very similar to those illustrated by F. Cambridge in the case of *C. flavens* (Fig. 323).

Maxillae. Essentially parallel; quite concave along outer margin; longer than wide in middle in ratio of about 2 : 1; somewhat dilated distally; outer distal corner rounded; with well developed scopula along truncature and a part of medial edge.

Lip. Wider at base than long in ratio of about 11 : 10; basal excavations reach about one third of length of organ; reaches to about middle of maxillae; distal end gently concave and about half as wide as base. Sternal suture gently procurved.

Sternum. In general scutiform. Longer than wide in ratio of 5 : 4,

widest opposite second coxae; only mildly convex; very narrowly marginate; truncated narrowly and squarely at posterior end and not extended between fourth coxae which are separated by about one fifth of their width.

Legs. 1342. Tibial index of first leg 11, of fourth leg 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.62	1.41	2.60	2.09	.88	9.60
2.	1.92	1.02	1.15	1.28	.64	6.01
3.	2.05	1.02	1.28	1.63	.63	6.61
4.	1.92	.83	1.21	1.66	.62	6.24
Palp	1.09	.45	.58	—	.70	2.82

First leg with a well developed fringe as follows: on dorsal surface of femur and a trace of one on retromargin of ventral surface in distal half; ventral surface of tibia and metatarsus. A fringe somewhat like this occurs also in *C. unicolor,* but it is not so well developed in that species. First coxae nearly twice as long as any other.

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral distal 2, retrolateral distal 1; patella only prolateral 0–1–0; tibia only prolateral 1–1–0, ventral 2–2 (staggered)–2–2; metatarsus prolateral and retrolateral 0–0–1, ventral 2–2–2. Second leg: femur and patella as in first; tibia only prolateral 1–1–1–0, retrolateral 0–0–1–0, ventral 2–0–2 (staggered)–2; metatarsus only prolateral 1–0–1, retrolateral 0–0–1, ventral 2–1r–2. Third leg: femur and patella as in first; tibia dorsal 1–0–0, prolateral and retrolateral 1–1–1, ventral 1p–0–2; metatarsus dorsal 1p–0–0, prolateral and retrolateral 1–2, ventral 0–2–2. Fourth leg: femur and patella as in first except femur prolateral distal 1; tibia as in third; metatarsus dorsal 1p–0–0, prolateral and retrolateral 1–1–2, ventral 1p–0–1p. No spines observed on palp.

Palp. Femur strongly curved as usual, with a snow white dorsal crest over distal three fourths; patella short and also covered dorsally with a continuation of the white crest of the femur; tibia longer than patella in ratio of a little less than 4 : 3, with a simple spur for retrolateral apophysis; tarsus longer than tibia in ratio of nearly 5 : 4, diameter of circle at distal end of bulb almost equal in length to that of bulb; embolus distinctly bifurcate at tip (Fig. 324).

Abdomen. Ovoid; rather small; longer than wide in ratio of 22 : 13, widest about two fifths from base which is squarely truncate; with a mildly developed tubercle just anterior to tracheal spiracle which lies

near base of spinnerets which are normal to genus; position of colulus indicated by a small cluster of black bristles.

Color in alcohol. Palpal femur and patella white from dorsal crests; proximal end of tibiae yellowish white, elsewhere together with tarsus reddish brown. Chelicerae dark reddish brown; maxillae and lip a little lighter, with yellowish tips. Sternum reddish brown. First pair of legs; patella and tarsus yellowish; tibia and metatarsus reddish brown; femur the same as the latter but darker. Second leg yellowish except the femur which is brownish. Other legs different shades of yellowish. Carapace bright reddish brown, darker around ventral margin; eyes on connected black spots with considerable red hair around them; an irregular white spot, made by scales which are loosely attached and easily rubbed off, at some distance behind thoracic groove. Abdomen: whole dorsum with many small iridescent scales giving a bright golden sheen; generally yellowish with an indefinite series of small brownish spots which faintly outline a lighter central stripe flanked on each side by a faint broken brownish stripe; venter dusky with faintly outlined rows of brownish spots and many dots.

Female allotype. Total length 5.12 mm. Carapace 2.30 mm. long, 1.73 mm. wide at level of posterior eyes which occupy nearly full width of carapace at that level; tallest in region of third row of eyes where it is 1.22 mm. tall and, therefore, about twelve seventeenths as tall as wide; with a short median longitudinal thoracic groove as usual in the genus.

Eyes. Seen from in front, recurvature of anterior row considerably less than in male, so that a line from dorsal borders of AME lies about one seventh of diameter of ALE above the latter. All eyes more or less surrounded with white scale-like hairs. Anterior row wider than posterior row in ratio of 78 : 75. Quadrangle of laterals wider than long in ratio of nearly 5 : 3. Total eye space occupies four sevenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 25 : 14.5 : 3 : 13. Height of clypeus equal to one fifth the diameter of AME.

Chelicerae. Parallel, vertical; fairly robust but not produced as in male; no boss visible; somewhat swollen in front. Fang fairly robust, evenly curved. Fang groove with two promarginal teeth and a single fissidentate retromarginal tooth very similar to that in the female of *C. cambridgei* sp. nov.

Maxillae. Essentially like those in male except outer concavity is less marked and they are not as long as in that sex.

Lip and *Sternum.* Essentially as in male.

Legs. 4312. Tibial index of first leg 16, of fourth leg 13.

	Femora	Patella	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.28	.77	.90	.72	.50	4.17
2.	1.15	.70	.77	.70	.47	3.79
3.	1.47	.58	.83	1.09	.51	4.48
4.	1.35	.70	1.02	1.15	.51	4.73

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral distal 2, retrolateral distal 1; patella only prolateral 0–1–0; tibia only prolateral 1–1–0, ventral 2–2–2(offset)–2; metatarsus only prolateral and retrolateral 0–0–1, ventral 2–2–2. Second leg: femur as in first; patella as in first except retrolateral 0–1–0; tibia as in first except ventral 2–1r–2–2; metatarsus as in first. Third leg: femur and patella as in second; tibia dorsal 1–0–0, prolateral and retrolateral 1–1–1, ventral 0–1p–1r–2; metatarsus dorsal 1–0–0, prolateral 1–2, retrolateral 1–1, ventral 0–2–2. Fourth leg: femur and patella as in second and third; tibia as in third except ventral 1p–1p–2; metatarsus dorsal 1–0–0, prolateral and retrolateral 1–1–2, ventral 0–1p–1p.

Abdomen. Ovoid, more robust than in male; longer than wide in ratio of 43 : 30; widest in middle; tubercle just anterior to tracheal spiracle much less conspicuous than in male. Otherwise essentially as in that sex.

Epigynum. Of usual form in the genus but incompletely divided centrally; about two thirds as long as wide; with large oval spermathecae (Fig. 325).

Color in alcohol. Palps light yellowish. All legs light amber with numerous darker spots. Carapace: generally light reddish brown; interocular area darker, eyes on connected black spots; lateral sides lighter, with ventral margin darker; an irregular white spot just behind thoracic groove; extending down posterior declivity is a broad light stripe and on each side of this is a narrower dark stripe. Abdomen: with a fairly definite color pattern; a median dorsal light stripe, narrow in front, widest in middle, narrowing somewhat in posterior half where there is a series of six or seven brownish chevrons; on each side of median light stripe is a broad broken brownish stripe extending the full length of abdomen; lateral sides with short narrow brownish stripes; venter dusky in middle and spotted finely with dots laterally.

Type locality. Male holotype, female allotype, and several paratypes of both sexes from Madden Dam region, C. Z., Aug., 1939; one male paratype from El Valle, R. P., July, 1936.

Cobanus electus spec. nov.

Figures 326–330

Male holotype. Total length 6.27 mm. Carapace 3.01 mm. long, 2.24 mm. wide just below middle eyes where an unusual fullness occurs; PLE occupy forty-four forty-ninths of width of carapace at that level; cephalic interocular region depressed centrally but bulging a little just medial to ALE and PME; outline in profile best shown in Fig. 326; 1.73 mm. tall and, therefore, a little more than three fourths as tall as wide; with no tufts of hair on cephalic region; with deposits of white guanin beneath chitin over whole interocular area; with short median longitudinal thoracic groove between posterior borders of PLE.

Eyes. Seen from in front, anterior row strongly recurved with dorsal borders of AME just slightly dorsal to centers of ALE. Anterior row almost exactly as wide as posterior row. Middle row about eight ninths as wide as other rows. Quadrangle of laterals wider than long in ratio of 22 : 15. Total eye space occupies a little more than one half the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 28 : 17 : 4.5 : 16.5. AME separated from one another by one eighteenth of their diameter, from ALE by twice as far. Middle eyes closer to PLE than to ALE in ratio of about 12 : 17. Height of clypeus equal to about one third of the diameter of AME. Clypeus decorated only with a few white scales which extend onto cheek region, three long bristles in lower angle between AME. Whole ocular region with isolated long stiff bristles but with no tufts of hair.

Chelicerae. Quite porrect, robust and produced; basal fourth of basal segment parallel, remainder strongly divergent; fang groove somewhat excavated, considerably flattened and transversely rugulose, with a large tooth on each side near base of fang, two other small promarginal teeth just at end of groove, and another of moderate size on retromargin about the middle (Fig. 327). Not much variation occurs among the three males of this species in my collection in respect to size of chelicerae.

Maxillae. Parallel, deeply notched in middle of outer border; longer than wide in middle in ratio of 42 : 17; somewhat dilated apically; outer distal corner rounded, not drawn out into a hook; not excavated contiguous to lip; with well developed scopula along truncature and extended toward base along medial border.

Lip. Only slightly longer than wide; as wide in middle as at base; regularly rounded at distal end; basal excavations reach about one third of length of organ. Sternal suture slightly recurved.

Sternum. Generally scutiform; longer than wide in ratio of 11 : 8; with a narrow complete margin; widest between second coxae; quite convex; sparsely covered with stiff bristles; with blunt posterior end not extended between fourth coxae which are separated by about half their diameter.

Legs. 1432. Tibial index of first leg 12, of fourth leg 10.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.18	1.22	2.01	1.66	.74	7.81
2.	1.86	.96	1.28	1.34	.63	6.07
3.	1.86	.90	1.48	1.73	.71	6.68
4.	1.98	.90	1.57	1.98	.77	7.20
Palp	1.15	.64	.77	—	.77	3.33

First leg most robust, with femur quite considerably enlarged and dorsally arched. Third femur with slight swelling on ventral surface about one third of length of segment from distal end. First coxa longest and most robust.

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral distal 1; patella only prolateral 0–1–0; tibia prolateral 1–0–0 (a paratype has 1–1–0), ventral 2–2–2–2 (second and third on promargin offset prolaterally); metatarsus only ventral 2–2–2. Second leg: femur and patella as in first except femur retrolateral distal 1; tibia only prolateral 1–1–0, ventral 1r–2–2–2 (third on promargin offset prolaterally); metatarsus only prolateral 1–1, ventral 2–1r–2. Third leg: femur dorsal 0–0–1–1–1, prolateral distal 2, retrolateral distal 1; patella as in first; tibia prolateral and retrolateral 1–1–1, ventral 1p–0–2; metatarsus dorsal 1r–0–2, prolateral and retrolateral 1–0–1, ventral 1p–0–2. Fourth leg: femur as in second; patella prolateral and retrolateral 0–1–0; tibia as in third; metatarsus dorsal 1r–0–2, prolateral and retrolateral 1–1–1, ventral 1p–0–1p. Apparently no palpal spines.

Palp. Femur strongly and regularly curved; with a moderately well developed cap of whitish hairs covering distal half of dorsal surface of femur and extended over proximal third of patella; tibia only longer than patella in ratio of about 7 : 6; tibia almost exactly as long as tarsus; tibial apophysis a simple spur; embolus, as usual, describes a circle equal in diameter to one third of length of bulb (Fig. 328).

Abdomen. Generally ovoid; longer than wide in ratio of 26 : 15, widest near middle, fairly broad at base; anal tubercle a flattened cone; spinnerets as usual in the genus; position of colulus shown by a

cluster of small black bristles; tracheal spiracle near base of spinnerets, without tubercle.

Color in alcohol. Chelicerae rich reddish brown; palps somewhat duller, with white crest on femur and patella as noted; lip and maxillae like chelicerae except with yellowish tips. Legs: first pair reddish brown in general; femora nearly black prolaterally and ventrally; tarsi yellowish; patellae with a white prolateral patch; second leg like first except lighter and without white patellar patch; third and fourth legs yellowish with distal femoral annulations and both distal and proximal annulations on tibiae and metatarsi. Carapace: generally a rich reddish brown; eyes on connected black spots; white scales seem to occur rather generally distributed but are more persistent in a median streak over the region of thoracic groove; sternum lighter. Abdomen: brownish at base and along lateral sides with streaks of yellowish; a narrow median stripe begins at base and extends to beyond middle where it expands into a rather broad chevron-like band and behind this is an irregular light spot; other parts of dorsum brownish with the exception of a narrow stripe at each dorsal basal corner which extends laterally and merges with the mottled color of that region; a broad dark ventral stripe broadens just behind genital furrow and then gradually narrows to terminate considerably anterior to tracheal spiracle.

Female allotype. Total length 4.61 mm. Carapace 2.10 mm. long, 1.47 mm. wide below interval between PME and PLE; posterior row occupies about twelve thirteenths of width of carapace at that level. Subchitinous deposits of guanin are very conspicuous throughout interocular area. Otherwise essentially as in male.

Eyes. Anterior row not as strongly recurved as in male. Anterior row slightly wider than posterior row. Quadrangle of laterals wider than long in ratio of 5 : 8. Ratio of eyes AME : ALE : PME : PLE = 21 : 12 : 3 : 11. AME separated from one another by one twenty-first of their diameter, from ALE by twice that distance. Middle eyes closer to PLE than to ALE in ratio of 10 : 13. Height of clypeus equal to one seventhof the diameter of AME.

Chelicerae. Short, parallel, vertical, robust; somewhat swollen in front; with no boss visible. Fang moderately robust; finely serrated along inner margin; apparently with a very minute tooth on inner margin near its base. Fang groove distinct; with two promarginal teeth near inner end; a single, deeply fissidentate tooth on retromargin, apparently representing the two separate teeth of the male (Fig. 329).

Maxillae, Lip, and *Sternum.* Essentially as in male.

Legs. 4312. Tibial index of first leg 16, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.09	.64	.71	.66	.40	3.50
2.	.98	.49	.60	.60	.36	3.03
3.	1.30	.55	.77	.86	.55	4.03
4.	1.33	.58	.95	1.62	.53	5.01

First coxae most robust, fourth longest.

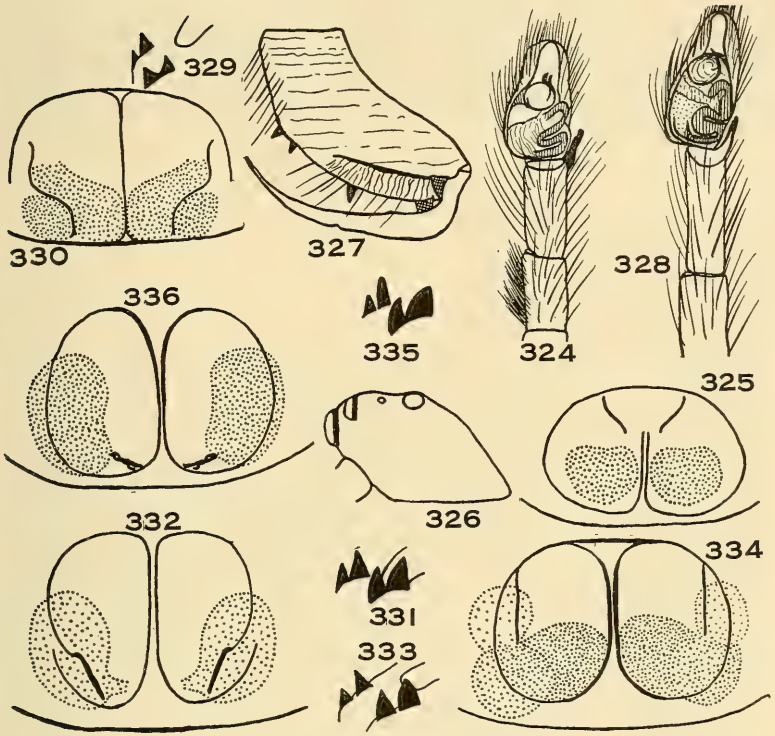
Spines. First leg: femur and patella as in male; tibia only ventral 2–2–2(offset to lateral positions)–2; metatarsus only ventral 2–2–2, Second leg: femur and patella as in male; tibia only retrolateral 0–0–1. ventral 1r–1r–2–1r; metatarsus only prolateral 0–1–1, ventral 2–2. Third leg: femur as in male; patella prolateral and retrolateral 0–1–0; tibia prolateral and retrolateral 0–1–1, ventral 1p–0–2; metatarsus prolateral and retrolateral 1–2, ventral 0–2. Fourth leg: femur as in second of male; patella as in third; tibia prolateral and retrolateral 1–1–1, ventral 1p–0–2; metatarsus prolateral and retrolateral 1–1–2, ventral 1p–1p.

Abdomen. Longer than wide in ratio of 10 : 7. Otherwise as in male.

Epigynum. Very simple and in accord with usual pattern in the genus; a white waxy plate bounded anteriorly by a recurved margin; a very low septum divides the organ into halves; within are two spermathecae lying at the outer posterior corners and with large associated tubules (Fig. 330).

Color in alcohol. Chelicerae reddish brown like those of male; maxillae and lip lighter and with yellowish tips; palps yellowish white. Coxae yellowish white; sternum a little darker. All legs yellowish white with many brownish spots and annulations. Carapace much like that of male; interocular area very light colored due to heavy deposits of subchitinous guanin; also with a yellowish stripe reaching from interocular area nearly to posterior border. Abdomen like that of male except it is darker colored.

Type locality. Male holotype from Canal Zone Biological Area, Aug., 1936; female allotype from the same locality, July, 1934; two male and two female paratypes from the same locality, July, 1934; one female paratype from El Valle, R. P., July, 1936.



External Anatomy of Spiders

Fig. 324. *Cobanus bifurcatus* Chickering; male palp, ventral view.
Fig. 325. *C. bifurcatus* Chickering; epigynum, ventral view.
Figs. 326–327. *C. electus* Chickering; male carapace, lateral view; and male chelicera.
Fig. 328. *C. electus* Chickering; male palp, ventral view.
Figs. 329–330. *C. electus* Chickering; female cheliceral teeth; and epigynum, ventral view.
Figs. 331–332. *C. incurvus* Chickering; female cheliceral teeth; and epigynum, ventral view.
Figs. 333–334. *C. obscurus* Chickering; female cheliceral teeth; and epigynum, ventral view.
Figs. 335–336. *C. seclusus* Chickering; female cheliceral teeth; and epigynum, ventral view.

Cobanus erythrocras Chamberlin and Ivie, 1936

The authors of this species had two males from the Canal Zone Biological Area selected from my collection of 1928. The description gives so little of the necessary information that I cannot be certain of its identification.

Cobanus extensus (Peckham), 1896

Helorus extensus Peckham, 1896
C. extensus F. Cambridge, 1900
Helpidius extensus Simon, 1901
C. extensus Petrunkevitch, 1911
C. extensus Petrunkevitch, 1925

I am compelled to regard the specimens identified as this species by Mr. Banks ('29) as in reality the same as my *C. electus* sp. nov. Professor Petrunkevitch did not have it in his collection from Panama and it has not yet appeared in mine. Apparently, therefore it has not been taken since F. Cambridge found it in the Champion collection from Bugaba. The Peckhams had seven males from Panama sent them by Count Keyserling. Four of the original lot still remain in the Peckham collection and there are two different species among them. Some of the more important features aiding in the identification of this species are: the absence of any tooth on the inner margin of the fang; absence of any large tooth near base of fang on basal segment; the first patella has a prolateral patch of white hairs; the palpal femur has a conspicuous dorsal crest of white hair; the palpal tibia is longer than the patella in ratio of 3 : 2; palpal tarsus shorter than tibia in ratio of 8 : 9; tibial spur with a beak-like tip; the bulb exhibits but one spine which is considered the embolus.

Cobanus flavens (Peckham), 1896

Helorus flavens Peckham, 1896
C. flavens F. Cambridge, 1900
C. flavens Petrunkevitch, 1911
C. flavens Petrunkevitch, 1925

The Peckhams had three males sent them by Count Keyserling. F. Cambridge identified what he considered the female. So far as I know, the species has not been taken since Cambridge's time. In identification the following characters appear to be very important: the fang lacks any tooth along its inner margin; the basal segment of the chelicera is probably not greatly developed; the palpal femur is

only moderately curved, and lacks a dorsal white crest; the embolus describes a circle of greater diameter than in most species and is accompanied by another spine, clearly visible in the type close to the cymbium; the palpal tibial apophysis continues broad nearly to distal end where it divides into two points of unequal size; palpal tibia only slightly longer than patella, but shorter than tarsus in ratio of 4 : 5.

Cobanus incurvus spec. nov.

Figures 331–332

Female holotype. Total length 6.59 mm. Carapace 2.94 mm. long, 2.05 mm. wide opposite posterior row of eyes which occupy eighty-four ninety-thirds of width of carapace at that level; interocular region slightly convex; form appears to be typical of the genus; 1.60 mm. tall and, therefore, about four fifths as tall as wide.

Eyes. Seen from in front, anterior row recurved so that a straight line from dorsal borders of AME cuts off about one sixteenth of diameter of ALE. Anterior row wider than posterior row in ratio of 18 : 17. Posterior row wider than middle row in ratio of 17 : 16. Quadrangle of laterals wider than long in ratio of 45 : 29. Total eye space occupies slightly less than five eighths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 29 : 16 : 4 : 16. AME separated from one another by two twenty-ninths of their diameter, from ALE by twice that distance. Middle eyes closer to PLE than to ALE in ratio of 13 : 18. Height of clypeus equal to one fifth the diameter of AME. Clypeus fringed ventrally by a row of loose, yellowish white scale-like hairs; also with the usual three bristles in lower angle between AME.

Chelicerae. Robust, vertical, parallel; not produced; swollen in front; without visible boss. Fang moderately slender, evenly curved, finely serrated along inner margin. Fang groove with two promarginal teeth at inner end of groove; two retromarginal teeth united basally to form a single, deeply fissidentate tooth (Fig. 331).

Maxillae. Parallel, robust; longer than wide in middle in ratio of about 2 : 1; only moderately concave along outer border; moderately dilated distally; well rounded at outer distal corners; not excavated contiguous to lip.

Lip. Longer than wide in ratio of 10 : 9; basal excavations reach almost half length of organ; as wide at distal end of excavations as at base, about half as wide at distal end as at base; reaches about four sevenths of length of maxillae. Sternal suture gently procurved.

Sternum. Generally scutiform; longer than wide in ratio of 26 : 17, widest between second coxae; posterior end blunt and not extended between fourth coxae which are separated by one seventh of their width; narrowly marginate.

Legs. 4312. Tibial index of first leg 15, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.60	.95	1.20	1.08	.60	5.43
2.	1.47	.89	.96	.98	.58	4.88
3.	1.92	.90	1.13	1.41	.63	5.99
4.	1.80	.83	1.28	1.54	.64	6.09

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral distal 2; retrolateral distal 1; patella only prolateral and retrolateral 0–1–0; tibia only prolateral 1–1–0, ventral 2–2–2–2, with third pair offset laterally; metatarsus prolateral and retrolateral 0–0–1, ventral 2–2–2. Second leg: femur and patella as in first; tibia prolateral 1–1–0; retrolateral 1–0–0, ventral 2–1r–2–2, with third offset laterally; metatarsus prolateral and retrolateral 0–0–1, ventral 2–2–2, with second pair offset laterally. Third leg: femur and patella as in first; tibia dorsal 1–0–0, prolateral and retrolateral 1–1–0, ventral 0–1p–2–2, with first pair offset laterally; metatarsus dorsal 1r–0–0, prolateral and retrolateral 1–0–2, ventral 0–2–2. Fourth leg: femur, patella, and tibia as in first except femur prolateral distal 1; metatarsus dorsal 1r–0–0, prolateral and retrolateral 1–1–2, ventral 1p–0–1p.

Abdomen. Ovoid; longer than wide in ratio of 53 : 30, widest in middle; anal tubercle a short, yellowish white, somewhat flattened cone; posterior spinnerets well spread apart so that middle pair is in plain view from dorsal side. Tracheal spiracle as usual near base of spinnerets, with a low inconspicuous tubercle covered with numerous short black bristles.

Epigynum. Of usual general pattern; about three fourths as long as wide; with characteristic striae near outer posterior corners dorsal to which appear the large spermathecae (Fig. 332).

Color in alcohol. All appendages and sternum yellowish white, with legs light amber dorsally. Carapace: lateral sides and posterior declivity light amber, somewhat streaked with both lighter and darker shades; eyes on connected black spots with white scales around AME and ALE, reddish scale-like hairs around PLE and extending to ALE; interocular area a reddish amber; apparently in life much of carapace

is covered with light golden scales. Abdomen: apparently in life covered by light golden scales both dorsally and laterally; the base is yellowish white and from this extends a central dorsal light stripe to anal tubercle embracing a few faintly outlined dusky chevrons in posterior half; on each side of the central light stripe are three irregular dusky spots (quite distinct in some paratypes); venter and ventrolateral sides yellowish white with faintly outlined darker streaks.

Type locality. Female holotype from the Canal Zone Biological Area, July, 1934. Several female paratypes from the following localities: Canal Zone Biological Area, June–July, 1934; June–Aug., 1936; July, Aug., 1939; El Valle, R. P., July, 1936.

Cobanus mandibularis (Peckham), 1896

Helorus mandibularis Peckham, 1896
C. mandibularis F. Cambridge, 1900
C. mandibularis Petrunkevitch, 1911
C. mandibularis Petrunkevitch, 1925
C. mandibularis Banks, 1929

This seems to be a common species in the regions of Panama where I have collected. The fang has a tooth on its inner margin about one third from its base. Male palp: femur with no special development of white hair; tibia longer than patella in ratio of about 4 : 3; tarsus slightly longer than tibia. The first patella has a prolateral patch of white hair. I have the species from the following localities: Canal Zone Biological Area, June–July, 1934; June–Aug., 1936; July–Aug., 1939; C. Z. Forest Reserve, C. Z., July, Aug., 1939; El Valle, R. P., July, 1936.

Cobanus obscurus spec. nov.

Figures 333–334

Female holotype. Total length 6.59. mm. Carapace 2.88 mm. long, 2.05 mm. wide at level of PLE which occupy eighty-eight ninety-thirds of width of carapace at that level; interocular region rather flat except for a shallow depression between PLE; gently swollen beneath PME and PLE; of the usual form for the genus; 1.53 mm. tall and, therefore, about three fourths as tall as wide.

Eyes. Seen from in front, anterior row recurved so that a line from dorsal borders of ALE cuts off about one twentieth of the diameter of AME. Anterior row wider than posterior row in ratio of 30 : 29. Middle row shorter than posterior row in ratio of 53 : 58. Quadrangle of laterals wider than long in ratio of about 3 : 2. Total eye region occupies forty-eight eighty-thirds of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 29 : 17 : 5 : 17. PLE and PME on low tubercles. AME almost contiguous, separated from ALE by two twenty-ninths of their diameter. Middle eyes closer to PLE than to ALE in ratio of 3 : 4. Height of clypeus equal to five twenty-ninths of diameter of AME. Clypeus decorated with a thin row of white hairs along ventral border, and the usual three long bristles in lower angle between AME.

Chelicerae. Robust, parallel, vertical; not produced; swollen diagonally in front; without visible boss. Fang slender, finely serrated along inner surface, evenly curved. Fang groove with two rather small teeth on promargin at inner end of groove; with two larger teeth about the middle of the retromargin (Fig. 333).

Maxillae. Parallel, robust; longer than wide in ratio of about 19 : 11; only gently concave along outer border and moderately dilated distally; not excavated contiguous to lip; with well developed scopula along truncature.

Lip. As wide as long, not much narrowed distally; basal excavations reach about two fifths of its length; reaches about half the length of the maxillae. Sternal suture gently procurved.

Sternum. Scutiform; longer than wide in ratio of 25 : 19; widest between second coxae, almost as wide between third and not much narrowed anywhere; moderately convex; blunt posterior end not extended between fourth coxae which are separated by nearly one fourth of their diameter; very narrowly and obscurely marginate.

Legs. 4312. Tibial index of first leg 17, of fourth leg 15.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.47	.96	1.22	1.00	.51	5.16
2.	1.47	.89	1.02	.94	.48	4.80
3.	1.81	.83	1.08	1.31	.53	5.56
4.	1.79	.80	1.12	1.47	.57	5.75

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral distal 1; patella 0; tibia only ventral 2–2–2–2, with third pair offset laterally

and all long and robust; metatarsus only ventral 2–2–2, with first pair very long. Second leg: femur as in first except retrolateral distal 1; patella 0–1–0 (lacking on right side); tibia only prolateral 1–0–1, ventral 2–1r–2–2; metatarsus only prolateral 0–0–1, ventral 2–2–2. Third leg: femur as in second; patella as in second except retrolateral 0–1–0; tibia only prolateral and retrolateral 0–1–1, ventral 1p–0–2; metatarsus dorsal 1r–0–0, prolateral and retrolateral 1–0–2, ventral 0–2–1. Fourth leg: femur dorsal 0–0–1–1–1, retrolateral distal 1; patella as in third; tibia prolateral 0–1–1, retrolateral 1–1–1, ventral as in third; metatarsus prolateral 1–0–2, retrolateral 1–1–2, ventral 0–1p–1p. Palpal spines: only femur dorsal 0–1–1.

Abdomen. Ovoid, longer than wide in ratio of about 3 : 2, widest near middle; anal tubercle a short pointed cone; posterior pair of spinnerets far apart so that middle pair is exposed dorsally, all pairs slender, anterior pair most robust. Small soft tubercle covered with short black bristles guards tracheal spiracle.

Epigynum. Of usual generic pattern; plate about two thirds as long as broad; spermathecae lie partly outside of plate and the short characteristic striations are parallel to long axis of body (Fig. 334).

Color in alcohol. A well marked species. Palps yellowish with a dark dorsal streak extending through the four distal segments. All legs an amber color with femora, patellae, tibiae, and metatarsi much annulated with reddish brown. Carapace: generally dark reddish brown; eyes on nearly black, connected spots; interocular area lighter; a broad stripe begins between PLE and narrows markedly about half-way to posterior border; on each side is a curved irregular stripe from AME to a little behind PLE, and below and behind the posterior end of this stripe are two short, somewhat diagonal bands also light colored. Abdomen: generally yellowish with dark brown markings; a central light stripe from base to just in front of anal tubercle embraces a series of spots and chevrons; on each side of the central light stripe is a broader brownish irregular stripe broken by a yellowish band at about three fifths of the distance from the base; lateral sides alternately and narrowly striped with yellowish and brownish; venter with an irregular brownish V ending at the tracheal spiracle and embracing some brownish spots; ventrolaterally with many small spots and irregular lines.

Type locality. Female holotype from El Valle, R. P., July, 1936. No paratypes.

Cobanus seclusus spec. nov.

Figures 335–336

Female holotype. Total length 5.50 mm. Carapace 2.54 mm. long, 1.89 mm. wide opposite third row of eyes which occupy about thirty-eight forty-thirds of width at that level; interocular region only gently convex with a slight depression between PLE; deposits of guanin show faintly through chitin in interocular area; longitudinal median thoracic groove as usual in the genus; general form as usual in the genus; 1.40 mm. tall and, therefore, a little less than three-fourths as tall as wide.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of ALE are slightly above the dorsal borders of AME. Anterior row wider than posterior row in ratio of 16 : 15, middle row shorter than posterior row in ratio of 14 : 15. Quadrangle of laterals wider than long in ratio of 8 : 5. Total eye space occupies forty seventy-sevenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 25 : 15 : 3 : 13.5. AME separated from one another by three fiftieths of their diameter, from ALE by three twenty-fifths of the diameter of AME. Middle eyes closer to PLE than to ALE in ratio of 6 : 7. Height of clypeus equal to one fifth of the diameter of AME. Clypeus decorated with just a few yellowish white hairs along ventral margin, and the usual three stiff bristles in lower angle between AME.

Chelicerae. Robust; almost three fourths as wide as long; parallel, vertical; not produced; swollen in front; without boss. Fang moderately slender, evenly curved, finely serrated along inner margin. Fang groove with two promarginal teeth near inner end; two retromarginal teeth united basally on left side into a very deeply fissidentate tooth while on the right side the two apparently remain separate to base (Fig. 335).

Maxillae. Parallel, robust; longer than wide in middle in ratio of about 2 : 1; quite concave along outer border; quite dilated distally; well rounded at outer distal corner; with well developed scopula along truncature.

Lip. Wider at base than long in ratio of 9 : 8; basal excavations reach nearly one half its length; reaches to about the middle of maxillae; distal end well rounded and about half as wide as base. Sternal suture gently procurved.

Sternum. Generally scutiform; longer than wide in ratio of 47 : 32; moderately convex; widest between second coxae, slightly narrower than base of lip at anterior border; posterior end blunt and not extended

between fourth coxae which are separated by about one sixth of their diameter; very narrowly marginate.

Legs. 4312. Tibial index of first leg 18, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.54	.83	1.02	.96	.56	4.91
2.	1.47	.77	.90	.84	.50	4.48
3.	1.79	.90	1.09	1.28	.62	5.68
4.	1.79	.70	1.21	1.47	.58	5.75

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral distal 2, retrolateral distal 1; patella only prolateral 0–1–0; tibia only prolateral 1–1–0, ventral 2–2–2–2, with third pair offset laterally; metatarsus prolateral and retrolateral 0–0–1, ventral 2–2–2. Second leg: femur and patella as in first except patella retrolateral 0–1–0; tibia as in first except ventral 2–2–2–1p, with third pair offset laterally; metatarsus prolateral and retrolateral 0–0–1, ventral 2–2–2, with second pair offset laterally. Third leg: femur and patella as in second; tibia dorsal 1–0–0, prolateral and retrolateral 1–1–0, ventral 1p–0–2–2, with second complete pair offset laterally; metatarsus dorsal 1r–0–0, prolateral and retrolateral 1–0–2, ventral 0–2–2. Fourth leg: femur and patella as in second except femur prolateral only distal 1; tibia as in third except dorsal 0; metatarsus dorsal 1r–0–0, prolateral and retrolateral 1–1–2, ventral 0–1p–1p. Palpal spines: only femur dorsal 0–1–1.

Abdomen. Ovoid, moderately robust; longer than wide in ratio of 8 : 5; broad at base; other features essentially as in *C. incurvus* sp. nov.

Epigynum. With usual general pattern; about three fourths as long as wide; large spermathecae lie dorsal to outer two thirds of epigynal plate; characteristic striations in lower part of each half (Fig. 336).

Color in alcohol. All appendages and sternum yellowish white, legs light amber dorsally. Carapace essentially as in *C. incurvus* sp. nov. Abdomen: apparently in life covered dorsally and laterally by light golden scales; dorsum generally yellowish white, with two pairs of large brownish spots on posterior half; elsewhere only a few small dusky spots and short streaks; laterally with short narrow dusky stripes; venter yellowish white with a few dusky streaks.

Type locality. Holotype female from the Canal Zone Biological Area, August, 1939. Several paratype females from the same locality: June–July, 1934; August, 1936, 1939; Canal Zone Forest Reserve, C. Z., Aug., 1939.

Cobanus subfuscus F. Cambridge, 1900

C. subfuscus Petrunkevitch, 1911
C. subfuscus Petrunkevitch, 1925?
C. subfuscus Banks, 1929?

Cambridge had only males and these were from Costa Rica. He seemed a little doubtful of the validity of the species and quite fully aware of the difficulty of identifications based upon such variable characters as the chelicerae. Petrunkevitch had one male from Cerro Flores, R. P. which he described in detail. I am not convinced that the species studied by Prof. Petrunkevitch is Cambridge's *subfuscus* in spite of the explanation for the latter's failure to see the split embolus. Judgment on this must await a careful study of more material. Mr. Banks had one male from the Canal Zone Biological Area, July, 1924. I have examined this specimen carefully and I am compelled to state that it resembles the original very closely. The species has not appeared in my collection.

Cobanus unicolor F. Cambridge, 1900

C. unicolor Petrunkevitch, 1911
C. unicolor Petrunkevitch, 1925

This species seems to be fairly common in the Canal Zone Biological Area and in the neighboring regions. Important characters for identification are: first pair of legs with a moderately well developed black ventral fringe on distal end of femur and on tibia and metatarsus; chelicerae usually produced, without a tooth on prolateral side near base of fang; fang lacks a tooth on its inner margin; two retromarginal teeth along fang groove fairly close together and fairly near the base of fang; palpal femur and patella without any white dorsal crest; palpal tibia longer than patella in ratio of about 15 : 11; palpal tarsus only slightly longer than tibia; diameter of circle at distal end of palpal bulb scarcely more than one fourth the length of the whole bulb. This species is in my collection from :Canal Zone Biological Area, July–Aug., 1934; July–Aug., 1936; July, 1939; Ft. Davis, C. Z., Aug., 1936; Madden Dam region, Aug., 1939.

Genus Titanattus Peckham, 1885

It seems probable that one of the two species herewith described belongs with *T. saevus* Peckham from Guatemala and known only from the male. The two species may be separated by the following key:

1. Retromargin of fang groove with three teeth. Epigynum with a large central depression incompletely divided by a low septum..... *T. paganus*, (p. 385)
1. Retromargin of fang groove with four teeth set very close together. Epigynum without a large central depression, but with a pair of very shallow, small, curved depressions..... *T. cretatus*, (p. 383)

Titanattus cretatus spec. nov.

Figures 337–340

Female holotype. Total length 3.78 mm. Carapace 1.73 mm. long, 1.18 mm. wide just behind PLE which project slightly beyond dorsal margin but occupy about forty-nine fifty-thirds of ventral width of carapace, .96 mm. tall and, therefore, .81 as tall as wide; ascent from AME quite steep to PLE from which steep posterior declivity descends almost immediately behind these eyes to posterior border; considerably depressed between PLE which stand on low tubercles; considerable hair and numerous bristles, long and slender in ocular region; lateral sides from ALE to PLE slightly concave in middle with ventral margin considerably wider than dorsal margin; widest a short distance behind PLE; with much subchitinous guanin, especially in interocular area; with a short median longitudinal thoracic groove a short distance behind PLE.

Eyes. Seen from in front, anterior row strongly recurved so that a line tangent to dorsal borders of AME cuts off about one third of the diameter of ALE. Anterior row wider than posterior row in ratio of 51 : 49, wider than middle row in ratio of 51 : 44. Quadrangle of laterals wider than long in ratio of 51 : 36. Total eye space occupies forty-five seventy-eights of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 18.5 : 9.5 : 2 : 8.5. AME separated from one another and from ALE by about one eighteenth of their diameter. Middle eyes equidistant from ALE and PLE. Height of clypeus equal to about one third of the diameter of AME (hidden by brush of hair). Clypeus decorated by a rich covering of long white hair convergent toward middle from both sides, two long white bristles beneath each

AME, and three whitish bristles upturned in lower angle between AME, upper one very long, two lower shorter.

Chelicerae. Vertical, parallel; basal segment .58 mm. long; without special features. Fang moderately robust, evenly curved. Fang groove distinct; promargin with four teeth fairly well spaced and occupying the greater part of the margin; retromargin with four teeth so closely crowded that their bases appear to be joined (Fig. 338).

Maxillae. Parallel; longer than wide in middle in ratio of about 21 : 11; only moderately concave in middle of outer border; outer distal corner well rounded, without tubercle or hook; with well developed scopula along truncature.

Lip. As wide as long; basal excavations reach one third of length of organ; reaches slightly beyond middle of maxillae; distal border broadly rounded. Sternal suture strongly procurved.

Sternum. Scutiform; longer than wide in ratio of 32 : 25, widest between second coxae; first coxae separated by twenty-two twenty-fifths of the greatest width of sternum; anterior border as wide as base of lip and with a small lobe at each end; posterior end blunt and not extended between fourth coxae which are separated by seven thirteenths of their width. Fourth coxae the longest but none notably enlarged.

Legs. 4132. Tibial index of first leg 15, of fourth leg 12.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.96	.58	.70	.51	.38	3.13
2.	.90	.51	.61	.51	.38	2.91
3.	.94	.45	.64	.64	.42	3.09
4.	1.08	.51	.83	.83	.42	3.67

All legs with a moderate supply of hair but with no fringes or special tufts.

Spines. First leg: femur only dorsal 0–1–1–1; patella 0; tibia only ventral 2–2–2, with a much greater distance between first and second pairs than between second and third pairs (Fig. 339); metatarsus only ventral 0–2–2. Second leg: femur and patella as in first; tibia only ventral 0–1r–2–2; metatarsus only ventral 0–2–2. Third leg: femur dorsal 0–1–1–1 and prolateral distal 1, lacking on right side; elsewhere 0. Fourth leg: femur only dorsal 0–1–1–1; elsewhere 0. Palpal spines 0.

Abdomen. Ovoid, but much broader at base than at posterior end; longer than wide in ratio of about 3 : 2; anal tubercle a short broad

inconspicuous cone; spinnerets of moderate size and length, anterior pair the stoutest and approximated, posterior pair slenderer and well spread apart so that the smallest middle pair is exposed to view from the rear; position of colulus indicated by a small tuft of black hair; tracheal spiracle near base of spinnerets, obscure.

Epigynum. Posterior margin with a distinct lip but no definite notch; two J-shaped loops show clearly near middle at sides of plate (Fig. 340).

Color in alcohol. Carapace: with a broad brownish stripe on each side from ALE to posterolateral corner having a coarsely serrated dorsal border; remainder of lateral sides and steep posterior declivity light brownish covered with very slender lanceolate white hair; eyes on black spots; interocular area with yellowish white figure made by aggregations of subchitinous deposits of guanin, the figure being constricted between ALE and PME and whitest in center where there is a slender elongated rugulose granule extending nearly the whole length of the figure; a yellowish white spot beneath ALE due to presence of guanin. Chelicerae brown. Palps yellowish white. Lip brown with whitish tip; maxillae light brown with whitish tips. Sternum and all coxae yellowish. Legs: yellowish white with many brown bars, a few brown spots and short stripes. Abdomen: dorsum generally yellowish white, largely because of presence of many small granules of the subchitinous guanin; with an obscure central broad lanceolate basal stripe extending nearly to middle and a pair of dark brown bars somewhat oblique in position near the middle, also a few obscure incomplete chevrons in posterior third; lateral sides with dark brown spots and short narrow stripes over the yellowish white subchitinous granules of guanin; venter with a broad brownish central stripe beginning a little behind the genital groove and surrounded by many small guanin granules.

Type locality. Female holotype from Canal Zone Biological Area, July, 1939. No paratypes.

Titanattus paganus spec. nov.

Figures 341–342

Female holotype. Total length 3.78 mm. Carapace 1.63 mm. long, 1.02 mm. wide at level of PLE which project beyond the margin, .88 mm. tall and, therefore, about .86 as tall as wide; surface granulate, especially in interocular area; with few hairs but many simple bristles

around eyes; ascent from AME to PLE steep, with PLE on prominent tubercle; descent from PLE to posterior border also steep; posterior declivity slightly convex in middle; lateral sides vertical to PLE then somewhat widened ventrally with widest part just posterior to these eyes (Fig. 341).

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about two fifths of the diameter of ALE. Anterior row and posterior row equal in width, both wider than middle row in ratio of 31 : 25. Quadrangle of laterals wider than long in ratio of 31 : 25. Total eye space occupies slightly more than half the length of the carapace. Ratio of eyes AME : ALE : PME: PLE = 16 : 8 : 2 : 8. AME separated from one another and from ALE by about one twelfth of their diameter. Middle eyes equidistant from ALE and PLE. Height of clypeus equal to a little less than one third of the diameter of AME. Clypeus decorated only with a few loose lanceolate white hairs, a few whitish bristles along ventral border, two long converging whitish bristles beneath each AME, and apparently only one long whitish bristle in lower angle between AME.

Chelicerae. Vertical, parallel; of moderate size, basal segment .45 mm. long; basal boss not observed. Fang of moderate size and length, evenly curved. Fang groove distinct; promargin with three teeth all well separated; retromargin with three teeth all crowded close together.

Maxillae. Parallel; longer than wide in ratio of about 19 : 10; lateral borders carried forward so that they stand somewhat obliquely; outer distal corners well rounded and continuous with rounded anterior borders; scopulae well developed along truncatures.

Lip. Wider than long in ratio of 4 : 3; basal excavations very short; distal border well rounded; does not quite reach to middle of maxillae. Sternal suture slightly procurved.

Sternum. Scutiform; longer than wide in ratio of about 6 : 5, widest between second coxae; first coxae well separated; anterior border slightly wider than base of lip; moderately convex; posterior end blunt, not extended between fourth coxae which are separated by one half their diameter.

Legs. 4132. Tibial index of first leg 16, of fourth leg 10.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.96	.58	.65	.58	.35	3.12
2.	.83	.45	.62	.51	.38	2.79
3.	.86	.32	.58	.64	.41	2.81
4.	1.03	.43	.83	.83	.42	3.54

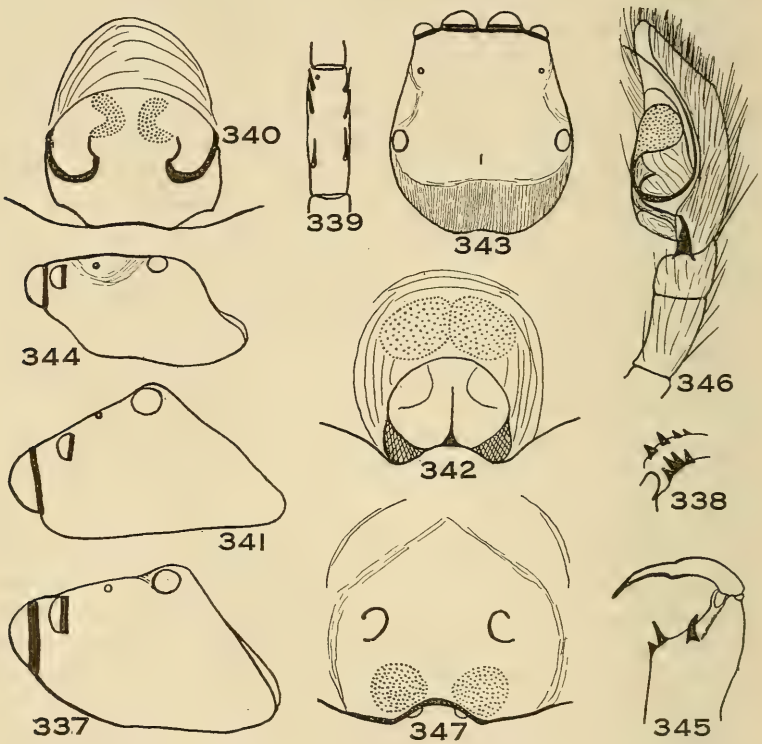
Spines. First leg: femur only dorsal 1–1–1; patella 0; tibia only ventral 2–2–2, with greater distance between first and second than between second and third; metatarsus only ventral 0–2–2. Second leg: femur and patella as in first; tibia only ventral 0–1r–1p; metatarsus only ventral 0–2–2. Third leg: femur and patella as in first; elsewhere 0. Fourth leg: femur as in first; elsewhere 0. No palpal spines observed.

Abdomen. Broadly ovoid, longer than wide in ratio of 36 : 23, widest five ninths from base which is moderately notched in middle. Anal tubercle a broad flattened cone. Six spinnerets: anterior pair short and stout; posterior pair slender and somewhat longer; middle pair slender and a little longer than anterior pair. Position of colulus probably indicated by a small tuft of hairs. Tracheal spiracle near base of spinnerets, with distinct lip but no tubercle.

Epigynum. Rather large and distinct; epigynal plate slightly longer than wide; a broad posterior marginal notch is bounded to right and left by a small lobule; the main part of plate occupied by a large central cavity incompletely divided by a narrow low central septum; anterior to the cavity is a pair of large contiguous spermathecae (Fig. 342).

Color in alcohol. Carapace: bright reddish brown, with all eyes except AME on black spots; in center of clypeus, lateral to each ALE, and dorsal to interval between AME are four lighter spots wtih indefinite boundaries; the whole interocular area somewhat lighter due to presence of subchitinous guanin deposits. Sternum yellowish white with light reddish brown spots. Palps missing on holotype but are yellowish white on a paratype. Legs: yellowish white with many reddish brown spots. Abdomen: with many irregular white subchitinous guanin deposits; extending from base to posterior end is a somewhat broken and irregular central dorsal stripe, the anterior end of which is brownish, near middle it becomes reddish and breaks up into a series of short reddish chevrons posteriorly; just behind the middle there is a pair of short, broad, dark brown or black bars thus making a kind of cross-shaped figure; remainder of dorsal area largely whitish due to deposits of guanin; lateral sides yellowish white with brown spots; venter with a cloudy brownish central broad stripe from genital groove to beyond middle where the stripe suddenly narrows to continue to tracheal spiracle; outside of this stripe are many white guanin deposits.

Type locality. Female holotype from Canal Zone Forest Reserve, C. Z., Aug., 1939; One female paratype, possibly not mature, from the Canal Zone Biological Area, July, 1934.



External Anatomy of Spiders

Fig. 337. *Titanattus cretatus* Chickering; female carapace, lateral view.
Fig. 338. *T. cretatus* Chickering; female cheliceral teeth.
Fig. 339. *T. cretatus* Chickering; first tibia, ventral view.
Fig. 340. *T. cretatus* Chickering; epigynum, ventral view.
Fig. 341. *T. paganus* Chickering; female carapace, lateral view.
Fig. 342. *T. paganus* Chickering; epigynum, ventral view.
Figs. 343–344. *Bryantella speciosa* Chickering; male carapace, dorsal and lateral views.
Fig. 345. *B. speciosa* Chickering; male chelicera.
Fig. 346. *B. speciosa* Chickering; male palp, retrolateral view.
Fig. 347. *B. speciosa* Chickering; epigynum, ventral view.

Zygoballus Group

Key to the genera in the Zygoballus Group

1. Carapace moderately tall; posterior row of eyes much wider than anterior row; posterior declivity moderately steep; somewhat inflated laterally at level of PLE. Abdomen without any definite scutum. First pair of legs moderately enlarged. Retromargin of fang groove with a single simple tooth ..... *Bryantella*, (p. 389)
1. Not with combination of characters given above 2
2. Carapace tall; posterior row of eyes slightly wider than anterior row; posterior declivity precipitous; not inflated laterally. Abdomen with a well developed scutum. First pair of legs slender. Retromargin of fang groove with three small teeth. Beetle-like in appearance ..... *Cylistella*, (p. 394)
2. Not with combination of characters given above 3
3. Carapace tall; posterior row of eyes somewhat wider than anterior row; posterior declivity precipitous; lateral sides moderately rounded but not inflated. Abdomen with a moderately developed scutum in males but not in females. First pair of legs considerably enlarged. Retromargin of fang groove with a single robust tooth ..... *Dryphias*, (p. 400)
3. Not with combination of characters given above 4
4. Carapace tall; posterior row of eyes slightly wider than anterior row; posterior declivity precipitous; lateral sides vertical and parallel. Abdomen with a poorly developed scutum. First pair of legs considerably enlarged. Retromargin of fang groove with three teeth ..... *Orvilleus*, (p. 401)
4. Carapace tall; posterior row of eyes only slightly wider than anterior row; posterior declivity steep but not precipitous; lateral sides full at level of PLE but hardly inflated. Abdomen with scutum in males but not in females. First pair of legs not notably enlarged. Retromargin of fang groove with a fissidentate tooth in females and usually a "hammer-headed" process in males ..... *Zygoballus*, (p. 404)

Bryantella gen. nov.

Carapace moderately high, fairly broad; mildly inflated in region of PLE; widest at level of PLE; with short median longitudinal thoracic groove between posterior borders of PLE; posterior declivity abrupt, slightly concave. *Eyes:* anterior row considerably recurved; PME much closer to ALE than to PLE; PLE occupy almost full width of carapace; posterior row considerably wider than anterior row; quadrangle of laterals considerably wider than long; total eye space occupies about two thirds the length of carapace. *Clypeus* fairly low. *Chelicerae:* somewhat porrect, moderately produced and somewhat

divergent in males, less so in females; retromargin of fang groove with a simple, single, fairly robust tooth. *Maxillae* parallel, unmodified. *Sternum:* elongate scutiform; moderately broad; moderately narrowed at anterior end. *Legs:* 1423 in males, 412=3 in females; first pair moderately enlarged; with no special fringes or tufts; leg spines moderately developed. *Abdomen:* somewhat depressed in middle; spinnerets moderately developed. *Genotype: Bryantella speciosa* sp. nov.

Bryantella speciosa spec. nov.

Figures 343–347

Male holotype. Total length 4.03 mm. Carapace 1.92 mm. long, 1.54 mm. wide at level of PLE which occupy almost the entire width of carapace; mildly inflated laterally in region of PLE (Fig. 343); .96 mm. tall and, therefore, .62 as tall as wide; nearly level from AME to beginning of steep posterior declivity which occurs about five sixteenths of the distance from PLE to posterior border; steep posterior declivity abrupt and slightly concave (Fig. 344); a short median longitudinal thoracic groove between posterior borders of PLE.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of ALE are slightly above those of AME. Posterior row wider than anterior row in ratio of 46 : 37, wider than middle row in ratio of 46 : 33. Quadrangle of laterals wider than long in ratio of 23 : 16. Total eye space occupies eighteen twenty-ninths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 18 : 9.5 : 2.5 : 8.5. AME separated from one another by one eighteenth of the diameter of AME, from ALE by one twelfth of their diameter. Middle eyes closer to ALE than to PLE in ratio of about 1 : 2. Height of clypeus equal to one ninth of the diameter of AME. Clypeus decorated only with a ventral fringe of fairly long brown bristles, two long brown bristles beneath outer boundaries of AME, and three long upturned yellowish bristles in lower angle between AME.

Chelicerae. Moderately porrect, produced, and divergent from near bases; with a well developed basal boss; robust at base, slender distally; basal segment .65 mm. long. Fang moderately robust and sinuous. Fang groove distinct; with two promarginal teeth, a small one and a much larger pointed one, both near medial end of groove; retromargin with a single, simple, fairly robust tooth near middle (Fig. 345).

Maxillae. Parallel; longer than wide in middle in ratio of about 29 : 12; widely and quite deeply concave along middle of outer border;

outer distal corner strongly angulate but with no tubercle or hook; with well developed scopula along truncature.

Lip. Longer than wide in ratio of 6 : 5; basal excavations reach a little more than one third of length of organ; reaches nearly three fifths of the length of the maxillae; distal border well rounded. Sternal suture straight.

Sternum. Elongate scutiform, longer than wide in ratio of 37 : 24, quite strongly convex between second and third coxae, widest between second coxae, anterior border considerably narrower than base of lip; first coxae separated by nearly half the greatest width of sternum and excavated at their bases to allow an overlap; posterior end bluntly pointed and not extended between fourth coxae which are nearly contiguous.

Legs. 1423. Tibial index of first leg 17, of fourth leg 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.09	.69	.83	.62	.38	3.61
2.	.88	.51	.54	.51	.35	2.79
3.	.83	.45	.51	.51	.35	2.65
4.	1.13	.52	.83	.70	.38	3.56
Palp	.65	.26	.19	—	.61	1.68

First leg moderately enlarged with femur considerably deepened and somewhat compressed laterally. All legs with a moderate supply of hair but without special fringes or tufts.

Spines. First leg: femur dorsal 0–1–1–1, prolateral distal 1; patella 0; tibia only ventral 2–2–2, with last pair near distal end, promarginal series occupying distal five eighths of segment and retromarginal series the distal three fourths; metatarsus only ventral 2–2. Second leg: femur and patella as in first except the first two dorsal femorals very long and slender; tibia only ventral 0–1r–0–2; metatarsus only ventral 2–2. Third leg: femur and patella as in second except retrolateral distal 1 on femur; tibia prolateral and retrolateral 0–1–0, ventral 0–0–2; metatarsus prolateral 0–2, retrolateral 0–1, ventral 0–2. Fourth leg: femur and patella as in third; tibia only ventral 0–0–2; metatarsus prolateral and retrolateral distal 1, ventral 0–2. Palpal spines: apparently only femur dorsal 0–0–1.

Palp. Femur quite strongly bent ventrally; patella and tibia both short, with latter about three quarters as long as former; tibial retrolateral apophysis a moderately stout simple spur; bulb moderately swollen, truncated at base; embolus arises from an inverted pyriform

lobule, extends toward base and then turns through about 240 degrees to terminate near anterior end of cymbium (Fig. 346).

Abdomen. Considerably separated from carapace, hence some workers would describe it as being pedunculate; nearly oval in outline, longer than wide in ratio of 32 : 19, widest near middle; somewhat depressed in middle where the second pair of dorsal sigilla occurs, each of these two sigilla being in a shallow pit; anal tubercle a fairly prominent cone with a strongly chitinized base and a yellowish white tip; six spinnerets of moderate length, anterior pair the stoutest and approximated, posterior pair slightly longer and well separated; position of colulus indicated by a small tuft of black hairs; tracheal spiracle near base of spinnerets, with lip but no tubercle.

Color in alcohol. Carapace: generally a rich reddish brown with eyes on black spots and numerous white lanceolate hairs nearly everywhere; also a narrow marginal white stripe from lateral ends of posterior border forward to slightly beyond the PLE. Sternum and chelicerae bright reddish brown; maxillae and lip the same with white tips. Palps reddish brown with numerous white lanceolate hairs especially on dorsal sides of tibiae and patellae. Legs: first pair with coxae and trochanters light brown, femora bright reddish brown, tarsi yellowish white, other segments each with a dorsal and two ventrolateral reddish brown stripes separated by yellowish white stripes; other legs much the same except lighter and femora with a dorsal yellowish white stripe. Abdomen: dorsally with five bars, the basal one light reddish brown with many iridescent scales, the second yellowish white, the third brownish, the fourth yellowish white, and the fifth nearly black and covering the posterior end; laterally light reddish brown; venter with a brownish central stripe bordered on each side by a row of yellowish dots.

Female allotype. Total length 5.53 mm. Carapace 2.30 mm. long, 1.79 mm. wide at level of PLE which occupy almost the full width of the carapace, 1.15 mm. tall and, therefore, about .64 as tall as wide; otherwise essentially as in male.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of ALE are slightly above those of AME. Posterior row wider than anterior row in ratio of 53 : 41, wider than middle row in ratio of 53 : 39. Quadrangle of laterals wider than long in ratio of 53 : 39. Total eye space occupies forty-three seventieths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 19.5 : 10.5 : 2.75 : 9.5. Middle eyes closer to ALE than to PLE in ratio of 11 : 27. Height of clypeus equal to about one twelfth of the diameter

of AME. Otherwise essentially as in male.

Chelicerae. Robust, slightly porrect, parallel; with well developed basal boss; moderately swollen in front; surface very rugulose in front; basal segment .83 mm. long. Fang fairly robust, evenly curved. Fang groove distinct; promargin with two ordinary teeth at inner end of groove; retromargin with a single, simple, moderately robust tooth near medial end of groove.

Maxillae and *Lip.* Probably essentially as in male, but partly hidden by first coxae.

Sternum. Longer than wide in ratio of 31 : 16; first coxae only separated by about one fourth the greatest width of the sternum. Otherwise essentially as in male.

Legs. 412=3. Tibial index of first leg 20, of fourth leg 16.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.34	.77	.83	.70	.38	4.02
2.	1.09	.61	.58	.58	.38	3.24
3.	1.03	.56	.58	.69	.38	3.24
4.	1.41	.64	.96	.83	.41	4.25

Spines. All legs as in male. Palpal spines as in male.

Abdomen. Separated from carapace so pedicel shows clearly between these two body parts, hence might be regarded as pedunculate; longer than wide in ratio of 27 : 17; with four small dorsal sigilla and no pits or dorsal constriction as in male.

Epigynum. Simple, closely resembles that of many species of Metaphidippus; a shallow posterior marginal notch; a pair of openings about four diameters of one of them apart (Fig. 347).

Color in alcohol. Carapace: almost identical to that of male. Palps yellowish white with a narrow reddish brown dorsal stripe. Other mouth parts essentially as in male. Legs: first pair as in male except there is only a single dorsal stripe of reddish brown; other legs also much as in male but with fewer stripes. Abdomen: general pattern as in male with five bars on dorsum but with some modification, reddish brown bar at base subdivided into four narrow bars somewhat indefinite in outline, fourth bar reddish brown with a large central yellowish white spot; numerous iridescent scales abound.

Type locality. Male holotype from Canal Zone Biological Area, August, 1939. Female allotype from same locality, July, 1939. One male paratype and three female paratypes, two of them immature, from the same locality, July, 1939. Two female paratypes from C. Z. Forest Reserve, C. Z., Aug., 1939.

Genus Cylistella Simon, 1901

The Cambridges ('94, '01) had only *Cylistella scarabaeoides* (O. Cambridge) from Panama. Professor Petrunkevitch had a single female from the San Lorenzo River region which he described in some detail as a new species. I think it is probable that *C. castanea* Petrunkevitch is a synonym of *C. scarabaeoides* (O. Cambridge), but I cannot be certain about it at this time. I think there can be no reasonable doubt that the female I have from the C. Z. Forest Reserve represents a new species and I have described it as such. At present, then, we have three species known from Panama but two are known only from females.

Cylistella castanea Petrunkevitch, 1925

Known only from a single female taken in the San Lorenzo River region of Panama. As already indicated, I am somewhat uncertain regarding the status of this species.

Cylistella fulva spec. nov.

Figures 348–349

Female holotype. Total length 1.91 mm. Carapace .76 mm. long (measured to dorsal rim of posterior declivity), .93 mm. wide at level of PLE which project beyond margin of carapace, .58 mm. tall and, therefore, about .62 as tall as wide; dorsal area only moderately convex; ascent from AME continues to beginning of posterior declivity although rise is slight beyond PLE; posterior declivity begins .22 mm. behind PLE; dorsal surface covered with minute pits from each of which arises a short procumbent light colored hair; no thoracic groove visible; lateral sides and probably posterior declivity pitted much as in *C. scarabaeoides*.

Eyes. Seen from in front, anterior row straight by centers. Posterior row wider than anterior row in ratio of 21 : 19. Middle row nearly as wide as anterior row. Quadrangle of laterals wider than long in ratio of 2 : 1. Total eye space occupies about two thirds of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 12 : 6 : 1.5 : 5.5. AME separated from one another by nearly one twelfth of their diameter, from ALE by nearly twice that distance. Middle eyes closer to ALE than to PLE in ratio of 9 : 11. Height of clypeus equal to about five twelfths of the diameter of AME. Clypeus decorated only with a few light colored bristles along ventral margin, a few light

colored hairs converging toward middle line, and a small group of stiff bristles in lower angle between AME.

Chelicerae. Shorter than maxillae; basal segment conical; vertical, parallel. Fang and fang groove so hidden that examination is impossible without serious injury to specimen.

Maxillae. Somewhat convergent; somewhat hidden by first coxae, but apparently longer than wide in middle in ratio of 5 : 3; considerably broadened and somewhat dilated distally.

Lip. Wider than long in ratio of 4 : 3. Sternal suture strongly procurved.

Sternum. Longer than wide in ratio of 5 : 3, widest between second coxae but nearly as wide between first and third; convex as described for C. scarabaeoides; anterolateral corners extended into distinct lobules; posterior end extended between fourth coxae which are separated by five sixths of their width.

Legs. 4132. Tibial index of first leg 19, of fourth leg 17.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.45	.24	.22	.20	.20	1.31
2.	.40	.22	.22	.20	.20	1.24
3.	.45	.18	.20	.22	.20	1.25
4.	.56	.22	.31	.29	.25	1.63

Spines. First leg: only tibia ventral 2–2–0 and metatarsus ventral 2–2. Second leg: apparently only tibia ventral 1r–1r–0. Third and fourth legs apparently 0. It is difficult to determine spines with certainty in this species.

Abdomen. 1.15 mm. long, 1.21 mm. wide; carried nearly in same plane as carapace; truncated anterior border .77 mm. wide, fits closely against posterior border of carapace at top of declivity; with a scutum which covers whole dorsum but does not fit closely over anal tubercle which is a short cone; anterior surface, apposed to posterior surface of carapace, also chitinized into a plate but less heavily than the scutum; spinnerets all short with anterior pair most robust; a ventral chitinized semicircular fold guards base of spinnerets; apparently tracheal spiracle lies at ventral center of this fold, also guarded by chitinized lip. Colulus invisible. Scutum much pitted and each pit with a single short light colored hair; other short hairs unrelated to pits also present.

Epigynum. Epigynal plate a quadrilateral figure much as in *C. castanea* Petrunkevitch. Obscure, with distinctive features largely lacking. Raised into a low longitudinal ridge medially; most distinc-

tive feature is the pair of small openings less than the diameter of one of them apart, seen most clearly from a posterior view (Figs. 348–349).

Color in alcohol. Palps and legs generally light yellowish. Legs with a few reddish brown ventral spots especially on first two pairs of tibiae and patellae; all segments with dusky areas irregularly distributed. Chelicerae and maxillae yellowish. Lip with a broad yellowish border and a deep amber center. Carapace: medium brown, not so shiny and waxy in appearance as in C. scarabaeoides; eyes on connected black spots; a few darker streaks irregularly distributed. Sternum an amber color; central convex region very granular with a darker border from which radiate the darker ridges to the margin. Abdomen: scutum a medium brown like the carapace; with a short dark median streak; lateral sides and venter gray with many folds.

Type locality. Female holotype from C. Z. Forest Reserve, C. Z., Aug., 1939. No paratypes.

Cylistella scarabaeoides (O. Cambridge), 1894

Figures 350–356

Coccorchestes scarabaeoides O. Cambridge, 1894
C. scarabaeoides F. Cambridge, 1901
Cylistella scarabaeoides Petrunkevitch, 1911
C. scarabaeoides Petrunkevitch, 1925

Male hypotype. Total length 1.60 mm. Carapace .93 mm. long, .95 mm. wide at level of PLE which protrude a little beyond margin of carapace; .60 mm. tall and, therefore, about .63 as tall as wide; viewed from above almost square in outline; dorsal area quite convex; from AME ascent quite marked to opposite PLE from which there is a gentle arch nearly to vertical declivity which begins about .26 mm. behind PLE; considerably wider at level of dorsal margin than at level of ventral margin and lateral sides somewhat concave especially near posterior end; no thoracic groove visible: dorsal surface covered with minute pits and lateral and posterior surfaces beaded, often in long irregular rows; short hair sparsely distributed over dorsal surface and to a lesser extent over lateral and posterior surfaces (Figs. 350–352).

Eyes. Viewed from in front, anterior row slightly recurved. Posterior row wider than anterior row in ratio of 43 : 38. Middle row almost as wide as anterior row. Quadrangle of laterals wider than long in ratio of 43 : 20. Total eye space occupies twenty-six forty-thirds of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 13 :

6 : 1.5 : 5. AME contiguous, separated from ALE by about one thirteenth of their diameter. Middle eyes closer to ALE than to PLE in ratio of 4 : 7. Height of clypeus equal to about one fourth of the diameter of AME. A few short whitish hairs on clypeus, those beneath ALE appressed, on clypeus somewhat erect.

Chelicerae. Rather small, basal segment not as long as maxillae; slightly convergent, vertical. Fang fairly long, slender, and evenly curved. Fang groove impossible to see without serious injury to specimen, but in dissected paratype there are three retromarginal teeth and only a single promarginal tooth.

Maxillae. Moderately convergent; longer than wide in middle in ratio of 5 : 3; moderately concave along outer margin; palp inserted into basal half; outer distal angle more than a right angle; not dilated distally.

Lip. Wider than long in ratio of about 8 : 7; reaches to about middle of maxillae. Sternal suture very strongly procurved.

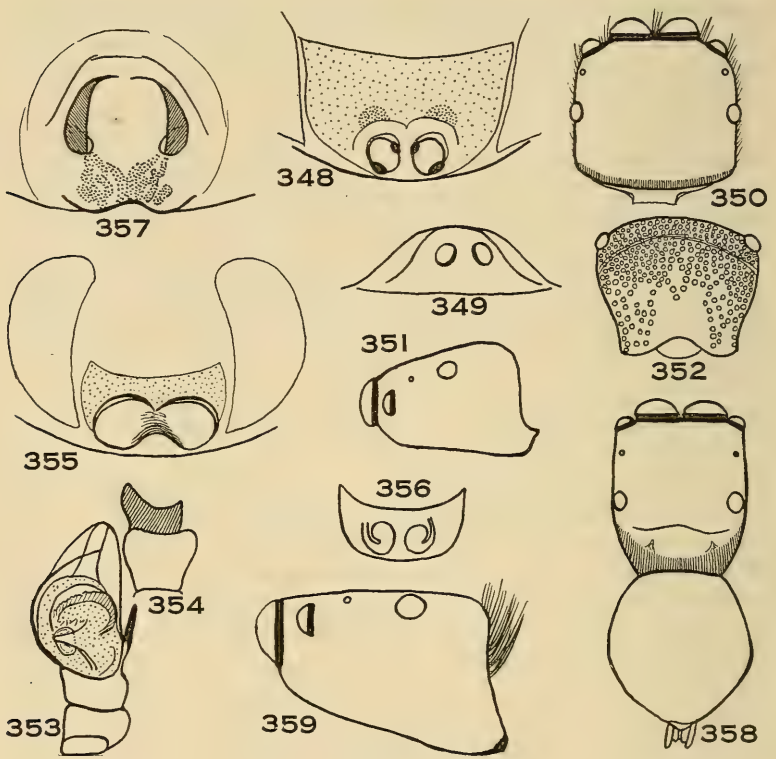
Sternum. Longer than wide in ratio of 20 : 13, widest between second and first coxae; convex in a peculiar manner with main part somewhat cardiform and much raised through center but sloping to make a wide margin through which ridges extend from the raised central part to near posterior border of the different coxae; at each anterolateral corner is a lobe which extends forward beyond base of lip; extended posteriorly to a blunt point far between fourth coxae which are separated by one half their width.

Legs. 1=423. Tibial index of first leg 25, of fourth leg 22.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.42	.22	.22	.19	.18	1.23
2.	.39	.20	.19	.18	.17	1.13
3.	.37	.17	.15	.16	.18	1.03
4.	.44	.20	.20	.20	.19	1.23
Palp	.27	.14	.11	—	.27	.79

Spines. Difficult to see but probably the following data are reliable: First leg: only metatarsus ventral 1p–2. Second leg: only metatarsus prolateral 0–1. Third leg: none. Fourth leg: none.

Palp. Femur straight; patella and tibia both short; tibial apophysis a thin transparent lamina which has its dorsal distal corner turned sharply away from the cymbium; bulb much swollen; embolus arises at base of bulb, makes a long regular curve to the distal end of the cymbium (Figs. 353–354).



External Anatomy of Spiders

Figs. 348–349. *Cylistella fulva* Chickering; epigynum, ventral and posterior views.

Figs. 350–352. *C. scarabaeoides*, male carapace, dorsal, lateral, and posterior views.

Figs. 353–354. *C. scarabaeoides*, male palp, ventral view; and palpal tibia, retrolateral view.

Fig. 355. *C. scarabaeoides*, epigynum, ventral view.

Fig. 356. *C. scarabaeoides*, epigynum, dissected, viewed from within.

Fig. 357. *Dryphias maccuni*, epigynum, ventral view.

Figs. 358–359. *Orvilleus crassus* Chickering; male body, dorsal view; and carapace, lateral view, larger scale.

Abdomen. .89 mm. long, 1.02 mm. wide, flattened and bent ventrally at its attachment with abdomen almost at an angle of 45 degrees; whole dorsum covered by a heavily chitinized scutum; that which is really the base is lightly chitinized and brought forward into an oblique position to fit against the carapace; viewed from below, pedicel appears to enter the center of abdomen, its insertion being surrounded by a chitinous collar incomplete at its dorsal two fifths. Anal tubercle hidden beneath posterior rim of scutum; all spinnerets short and crowded together. Colulus invisible. Tracheal spiracle near base of spinnerets, guarded by a chitinized lip.

Color in alcohol. Chelicerae and lip a reddish brown, streaked with black. Maxillae and palp somewhat lighter and also with dark streaks. All legs nearly the same: coxae and femora light yellowish brown above, very dark on lateral sides; other segments light yellowish, somewhat streaked with dark brown. Sternum much like carapace. Carapace a rich dark shiny mahogany brown with considerable bluish iridescence in certain lights. Scutum like carapace. Lateral sides and venter of abdomen grayish.

Female hypotype. Total length 1.73 mm. Carapace .93 mm. long, .96 mm. wide at level of PLE, .68 mm. tall; shallowly grooved just behind and below PLE, also visible in male to a slight degree. Otherwise essentially as in male.

Eyes. Viewed from in front, anterior row straight by centers. Posterior row wider than anterior row in ratio of 11 : 10. Quadrangle of laterals wider than long in ratio of 2 : 1. Ratio of eyes AME : ALE : PME : PLE = 13 : 5.5 : 1 : 5. AME barely separated from one another, from ALE by three twenty-sixths of the diameter of AME. Clypeus strongly margined. Whitish hairs lacking on clypeus. Otherwise essentially as in male.

Chelicerae, Maxillae, Lip, and *Sternum.* Essentially as in male, but paratype not dissected to show teeth on fang groove.

Legs. 4123. Tibial index of first leg 26, of fourth leg 18.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.44	.23	.20	.20	.18	1.25
2.	.36	.17	.17	.17	.18	1.05
3.	.36	.17	.16	.18	.17	1.04
4.	.49	.23	.24	.21	.19	1.36

Spines. First leg: only tibia ventral 1r–1r–0 and metatarsus ventral 2–2. Second leg: only tibia ventral 1r–1r–0. Third and fourth legs apparently without spines, but it is difficult to be certain in this species.

Abdomen. Essentially as in male except the scutum is less extensive and does not fit as closely around anal tubercle and spinnerets. Anal tubercle apparently with a narrow chitinized ring near its base. Spinnerets with posterior pair spread wide apart so as to expose middle pair to view.

Epigynum. A strongly chitinized plate with a posterior marginal notch, a central ridge on each side of which is a rounded region, somewhat depressed (Fig. 355). Dissection reveals the presence within of a pair of looped tubules near the posterior margin (Fig. 356).

Color in alcohol. Essentially like that of male in all major details.

Type locality. Male hypotype from Canal Zone Biological Area, July, 1939; female hypotype from the same locality, July, 1936. Several additional males and females from: Canal Zone Biological Area, July, 1934; July, 1936; June–Aug., 1939; Ft. Sherman and C. Z. Forest Reserve, C. Z., Aug., 1939.

Genus Dryphias Simon, 1901

Dryphias maccuni (Peckham), 1895

Figure 357

Homalattus maccuni Peckham, 1895
H. rusticus Peckham, 1895
D. maccuni Simon, 1901
D. rusticus Simon, 1901
Homalattoides roseus F. Cambridge, 1901
Partona roseus Simon, 1903?
D. maccuni Petrunkevitch, 1911
D. rusticus Petrunkevitch, 1911
Partona ? roseus Petrunkevitch, 1911
P. roseus Petrunkevitch, 1925
H. roseus Banks, 1929
Beata magna Banks, 1929

The Peckhams had several females from South America, exact location uncertain, probably Brazil. Later they also had two definitely from Brazil. They described these females as *Homalattus maccuni.* They had several males sent to them by Simon from the Amazon region and they described these as *Homalattus rusticus.* They also had a male from Trinidad which is now labelled *H. rusticus,* but I think it is not this species. Mr. Banks had two males from the Canal Zone Biological Area which he identified as *H. roseus* F. Cambridge. I have

several examples of both sexes from Panama, and the two have been taken together repeatedly. I think there is no reasonable doubt of the synonymy as I have given it above. Although Mr. Emerton provided a figure of the epigynum for the Peckhams it is not very accurate and may have been taken from an immature specimen. For this reason I have made another drawing of this organ (Fig. 357). The epigynal plate is somewhat circular; a well defined posterior marginal notch occurs with a strongly chitinized border; just anterior to notch is a hump, dorsal to which are several small tubules; further anterior occurs a squarish depressed area on each side of which is a strongly chitinized strip; finally the anterior border is well defined. Hypotypes should be described in detail.

Orvilleus gen. nov.

Carapace high, especially in posterior half, moderately broad; widest near PLE; lateral sides nearly vertical and also parallel in cephalic part; with no median longitudinal thoracic groove observed; steep posterior declivity very abrupt and somewhat concave. *Eyes:* anterior row moderately recurved; PME somewhat closer to ALE than to PLE; PLE occupy nearly the full width of the carapace; anterior and posterior rows of nearly equal width; quadrangle of laterals considerably wider than long; total eye space occupies about two thirds of length of carapace. *Clypeus* moderately low. *Chelicerae* vertical, parallel, of moderate size. Fang groove distinct; with three teeth along retromargin. *Maxillae* parallel, unmodified. *Sternum* moderately convex, broad; with anterior end only moderately narrowed between first coxae. *Legs:* 1432; all legs moderately robust with first pair considerably enlarged; without special fringes; leg spines showing some tendency toward reduction. *Abdomen:* short, broad; spinnerets of moderate size. *Genotype: Orvilleus crassus* sp. nov.

Orvilleus crassus spec. nov.

Figures 358–362

Male holotype. Total length 2.88 mm. Carapace 1.49 mm. long, 1.15 mm. wide at level of PLE which occupy almost the whole width of the carapace, .90 mm. tall and, therefore, about .78 as tall as wide, ascent very gradual from AME to PLE, then gently arched to steep

posterior declivity which begins almost three fourths of the distance from PLE to posterior border; steep posterior declivity very abrupt and somewhat concave; lateral sides from AME to PLE vertical and nearly parallel; a moderate supply of hair nearly everywhere and stiff black bristles in ocular area; a fringe of somewhat erect whitish hair around the top of steep posterior declivity; no median thoracic groove observed (Figs. 358–359).

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one ninth of the diameter of AME. Posterior row slightly wider than anterior row, wider than middle row in ratio of 51 : 46. Quadrangle of laterals wider than long in ratio of 10 : 7. Total eye space occupies nearly nine fourteenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 18 : 8.5 : 1.5 : 8.5. AME barely separate from one another and from ALE. Middle eyes closer to ALE than to PLE in ratio of 8 : 11. Height of clypeus equal to one sixth of the diameter of AME. Clypeus decorated only with a fringe of ventral light brown bristles, a few slender white hairs at each end of fringe, two long brown bristles beneath each AME, and apparently three long upturned bristles in lower angle between AME, these latter being brownish in basal halves and whitish in distal halves.

Chelicerae. Vertical, parallel; slightly swollen in front near base; basal segment .45 mm. long, without special modifications. Fang of moderate size, evenly curved. Fang groove distinct; with four small teeth along promargin, well spaced; retromargin with three closely crowded teeth on right side and three on left side with the third provided with two cusps and a tubercle beside it (regarded as abnormal).

Maxillae. Parallel; longer than wide in middle in ratio of 8 : 5; only slightly concave in middle of outer border; outer distal corner smoothly rounded without tubercle or hook; with well developed scopula along truncature.

Lip. Slightly wider than long; basal excavations reach about one third of length of organ; reaches to middle of maxillae; distal border truncated. Sternal suture quite strongly procurved.

Sternum. Scutiform; moderately convex, especially across the middle; longer than wide in ratio of 6 : 5; anterior border slightly wider than base of lip and with a low tubercle at each lateral end; anterior coxae separated by nearly three fifths of the greatest width of sternum; posterior end bluntly rounded and not extended between fourth coxae which are separated by nearly one half their diameter. First coxae considerably enlarged.

Legs. 1432. Tibial index of first leg 18, of fourth leg 15.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.87	.63	.67	.50	.33	3.00
2.	.72	.47	.49	.47	.33	2.48
3.	.72	.33	.43	.47	.33	2.28
4.	.90	.37	.53	.48	.34	2.62
Palp	.50	.21	.13	—	.40	1.24

All legs with a moderate supply of hair but with no special fringes or tufts. First pair considerably enlarged (Fig. 360).

Spines. First leg: femur dorsal 0–1–1–1, prolateral only distal 1; patella only prolateral 0–1–0; tibia prolateral 0–0–1–0, ventral 2–2–2, last pair not terminal, first pair a little more than one fourth of length of segment from base, space between first and second much greater than between second and third; metatarsus only ventral 0–2–2. Second leg: femur and patella as in first except femur retrolateral distal 1; tibia prolateral 0–1–1–0, ventral 1r–1r–2; metatarsus only ventral 0–1r–2. Third leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 1; patella 0; tibia prolateral and retrolateral 0–1–0, ventral 0–0–1p; metatarsus 0. Fourth leg: femur and patella as in third; tibia only ventral 0–0–2; metatarsus 0. Palpal spines: apparently only femur dorsal 0–0–1.

Palp. Femur only gently curved; both patella and tibia short with latter about two thirds as long as former; tibia with two retrolateral apophyses, the more ventral one short, blunt, irregularly tuberculated distally, the other is a short spur, stout at base but slender distally and somewhat hooked; embolus starts from anterior border of bulb as a stout tube and describes a nearly complete circle around periphery of bulb terminating in a slender filament (Figs. 361–362).

Abdomen. Length 1.47 mm.; longer than wide in ratio of 23 : 19 exclusive of anal tubercle; with numerous erect whitish hairs and black bristles near base on dorsum; with a poorly developed and incomplete dorsal scutum on anterior half; anal tubercle a short broad cone; six spinnerets of moderate length and size, anterior pair stoutest and approximated, posterior pair somewhat slenderer and spread far apart with the result that the middle pair is clearly revealed as smallest from the rear; position of colulus indicated by a small tuft of black hairs; tracheal spiracle near base of spinnerets, obscure, without tubercle.

Color in alcohol. Carapace: generally reddish brown, with eyes on black spots; numerous slender white hairs, especially around dorsal margin; interocular space with many subchitinous granules of white guanin making this region light colored with two dark colored spots near center. Chelicerae reddish brown. Maxillae and lip brown with whitish tips. Sternum light brown. Legs: first pair brown, with tarsi and prolateral surfaces of femora dark brown and metatarsi yellowish white; other legs similar with variations. Abdomen: region of weakly developed scutum reddish brown with two pairs of sigilla near center; just behind scutum is a transverse band of numerous yellowish white granules of guanin and in posterior quarter several obscure light and dark alternate chevrons; lateral sides brown with yellowish dots; venter dark brown with two rows of yellowish dots near center.

Female. A female which is probably immature is the only specimen of this sex available. The description of the allotype is, therefore, deferred until more material is available. The retromargin of the fang groove in this female shows three separate teeth.

Type locality. Male holotype from the C. Z. Forest Reserve, C. Z., Aug., 1939. One male paratype and the immature female from the Canal Zone Biological Area, July, 1939.

Genus Zygoballus Peckham, 1885

The Peckhams had a single female from Panama for which they made the genus Messua. Simon transferred the genus to Zygoballus. Professor Petrunkevitch had two females upon which he based the description of *Z. maculatipes.* Mr. Banks identified a female as *Z. rufipes* Peckham, but I believe this specimen to belong to *Z. optatus* sp. nov. Mr. Banks also identified an immature female as *Z. tibialis* F. Cambridge. This specimen is impossible to place with certainty but it probably belongs to one of the new species described in this paper. I conclude, therefore, that at the present time four species of Zygoballus are known from Panama, two of them only from females.

Key to the species of Zygoballus from Panama

Males

1. Palpal tibial apophysis slender, fully half as long as bulb; embolus long and slender, fully half as long as bulb..... *Z. optatus,* (p. 410)
1. Palpal tibial apophysis short and robust, about one third as long as bulb; embolus about one third as long as bulb..... *Z. electus,* (p. 405)

No workable key has yet been devised for use with the four kinds of females now referred to this genus.

Zygoballus desidiosus (Peckham), 1896

Messua desidiosa Peckham, 1896
M. desidiosa F. Cambridge, 1901
Z. desidiosus Simon, 1903
M. desidiosa Banks, 1909
Z. desidiosus Petrunkevitch, 1911
Z. desidiosus Petrunkevitch, 1925

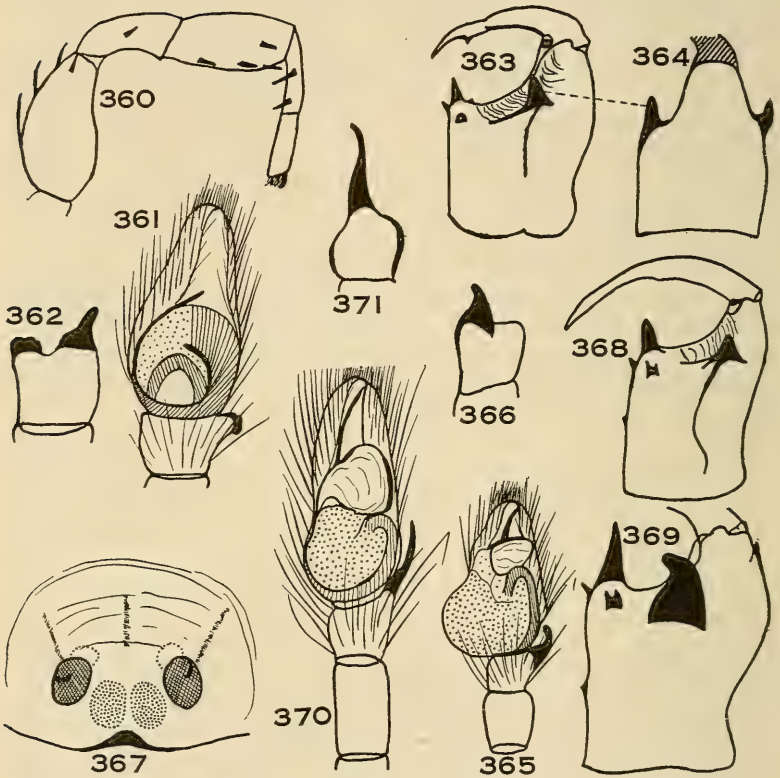
I am very doubtful of the correctness of the assignment of the species to the genus Zygoballus. The type should be carefully studied in accord with modern methods. Apparently the species has not yet appeared in my collection. The type female was sent to the Peckhams by Count Keyserling.

Zygoballus electus spec. nov.

Figures 363–367

Male holotype. Total length 2.24 mm. Carapace 1.26 mm. long, 1.02 mm. wide at level of PLE which occupy full width of carapace, .77 mm. tall and, therefore, about .75 as tall as wide; dorsal surface nearly flat back to steep posterior declivity which begins a little more than one third of the distance from PLE to posterior border and is typically abrupt for the genus; with a median longitudinal thoracic groove of moderate length beginning opposite posterior borders of PLE.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one twelfth of the diameter of AME. Posterior row wider than anterior row in ratio of 24 : 23, wider than middle row in ratio of 24 : 21. Quadrangle of laterals wider than long in ratio of 48 : 35. Total eye space occupies about forty fifty-sevenths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 15.5 : 8.5 : 1.75 : 7.5. AME contiguous to one another and to ALE. Middle eyes closer to ALE than to PLE in ratio of 11 : 9. Height of clypeus equal to about one fourth of the diameter of AME. Clypeus decorated with a rich coat of white lanceolate hair showing considerable iridescence, one long white bristle beneath outer border of AME, and probably three long, upturned, light colored bristles in lower angle between AME.



External Anatomy of Spiders

Fig. 360. *Orvilleus crassus* Chickering; first leg, prolateral view.
Figs. 361–362. *O. crassus* Chickering; male palp, ventral view; and palpal tibia, retrolateral view.
Figs. 363–364. *Zygoballus electus* Chickering; male chelicera, two views.
Figs. 365–366. *Z. electus* Chickering; male palp, ventral view; and palpal tibia, retrolateral view.
Fig. 367. *Z. electus* Chickering; epigynum, ventral view.
Figs. 368–369. *Z. optatus* Chickering; chelicera of holotype and of a paratype.
Figs. 370–371. *Z. optatus* Chickering; male palp, ventral view; and palpal tibia, retrolateral view.

Chelicerae. Only slightly porrect, considerably divergent; with several white lanceolate hairs on basal half in front; with a fairly robust tooth in front about three fifths from base; basal segment .38 mm. long; no basal boss observed. Fang of moderate size and length; moderately sinuous; with a definite small tooth on inner margin about one fourth from tip. Fang groove distinct, moderately excavated in middle; promargin with two teeth near medial end of groove, a very small tooth and a much larger one, both arising from a common base; retromargin with the remains of the fissidentate tooth much reduced, with the "hammer-headed" process only moderately developed (Figs. 363–364, taken from paratypes to avoid serious injury to the holotype).

Maxillae. Slightly convergent; longer than wide in ratio of about 2 : 1; only moderately notched in middle of outer border; with well developed scopula along truncature; outer distal corner well rounded, but with a very minute tubercle (not visible unless maxilla is removed for examination).

Lip. Wider than long in ratio of 6 : 5; basal excavations very short, obscure; reaches to about the middle of maxillae. Sternal suture straight.

Sternum. Scutiform, quite convex; longer than wide in ratio of 23 : 20; anterior border as wide as base of lip; first coxae separated by thirteen twentieths of the width of the sternum; widest between second coxae; posterior end bluntly rounded, not extended between fourth coxae which are separated by three tenths of their width.

Legs. 1423. Tibial index of first leg 16, of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.83	.51	.56	.38	.32	2.60
2.	.54	.32	.38	.30	.29	1.83
3.	.51	.30	.32	.32	.29	1.74
4.	.80	.35	.58	.38	.29	2.40
Palp	.48	.17	.11	—	.38	1.14

All legs with a moderate supply of hair but no fringes or tufts.

Spines. First leg: femur only dorsal 0–1–1–1; patella 0; tibia only ventral 2–2–2; metatarsus only ventral 2–2. Second leg: femur only dorsal 0–0–1–1; patella and metatarsus as in first; tibia only prolateral 0–1, ventral 0–1r–0. Third leg: metatarsus 0–1 prolateral; elswehere 0. Fourth leg: femur dorsal 0–1–1–0; patella and tibia 0; metatarsus as in third. Palpal spines: apparently only femur dorsal 0–0–1.

Palp. Femur only slightly bent ventrally; both patella and tibia short with latter about two thirds as long as former; tibial retrolateral apophysis a short stout spur turned inward at tip; embolus a slightly curved slender spine at tip of bulb (Figs. 365–366).

Abdomen. Almost a perfect oval in outline; longer than wide in ratio of 19 : 15; with a moderately well developed dorsal shield covering nearly entire dorsum; anal tubercle an inconspicuous yellowish white cone; six spinnerets small and closely crowded, anterior pair stoutest; position of colulus uncertainly indicated; tracheal spiracle near base of spinnerets with lip but no tubercle.

Color in alcohol. Carapace: almost uniformly reddish brown; eyes on black spots; white hairs on clypeus continued beneath ALE and PLE to posterolateral corners and part way down posterior declivity as a somewhat indefinite stripe on each side. Sternum and mouth parts different shades of reddish brown and brown. Legs: first pair entirely reddish brown except the yellowish tarsi; second and third pairs yellowish white with brownish ventral spots near distal ends of femora and brownish spots at intersections of patellae, tibiae, metatarsi, and tarsi; fourth pair yellowish white with brownish prolateral spots on coxae, distal two thirds of femora reddish brown and brownish spots at intersections of patellae, tibiae, metatarsi, and tarsi. Abdomen: dorsal shield reddish brown overlying a series of brownish and yellowish chevrons in posterior two thirds; dorsolaterally on each side is a discontinuous white stripe from base to about the middle, then a white spot half-way to spinnerets; lateral sides brownish with narrow alternate brownish and yellowish stripes; venter with a broad brownish stripe from genital groove to base of spinnerets.

Female allotype. Total length 3.07 mm. Carapace 1.28 mm. long, 1.09 mm. wide at level of PLE, .70 mm. tall and, therefore, .64 as tall as wide; other features essentially as in male.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one tenth of the diameter of AME. Posterior row wider than anterior row in ratio of about 25 : 23, wider than middle row in ratio of about 25 : 21. Quadrangle of laterals wider than long in ratio of 10 : 7. Total eye space occupies two thirds of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 15 : 8 : 2 : 8. AME barely separated from one another and from ALE. Middle eyes closer to ALE than to PLE in ratio of about 11 : 10. Height of clypeus equal to about two fifteenths of the diameter of AME. Clypeus decorated as in male.

Chelicerae. Vertical, parallel, of moderate size; basal segment .30 mm. long, excavated along medial border so that a small oval opening exists between the two. Fang moderately robust, evenly curved. Fang groove distinct; promargin with two teeth as usual; retromargin with an obscurely fissidentate tooth, visible as such only from certain angles.

Maxillae. Parallel, probably without minute tubercle at outer distal corner; otherwise as in male.

Lip. Slightly longer than wide. Otherwise essentially as in male.

Sternum. Longer than wide in ratio of 4 : 3. Otherwise essentially as in male.

Legs. 4123. Tibial index of first leg 21, of fourth leg 15.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
		(All measurements in millimeters)				
1.	.71	.37	.51	.37	.31	2.27
2.	.58	.28	.32	.30	.26	1.74
3.	.57	.28	.34	.32	.30	1.71
4.	.90	.36	.51	.45	.32	2.54

Spines. First leg: tibia only ventral 2–2–2; metatarsus only ventral 2–2; elsewhere 0, tibial and metatarsal spines robust, long. Second leg: tibia ventral 0–1r–0; metatarsus ventral 2–2; elsewhere 0. Third leg: none observed. Fourth leg: metatarsus prolateral and retrolateral 0–1; elsewhere 0. No palpal spines.

Abdomen. Broadly ovoid, longer than wide in ratio of 14 : 11, widest a little behind the middle; other features essentially as in male.

Epigynum. Of moderate size; epigynal plate wider than long; with a very shallow posterior marginal notch having a broad rim; two strongly chitinized depressions nearly twice the width of one of them apart (Fig. 367).

Color in alcohol. Carapace: generally reddish brown, somewhat lighter than in male; eyes on black spots; white lanceolate hairs scattered over surface except for triangular area overlapped by abdomen which is smooth and devoid of hair; with no definite stripes. Palps yellowish white. Chelicerae light reddish brown; lips and maxillae nearly the same with whitish tips. Sternum brown. Legs: first pair generally reddish brown with tarsi and middle of metatarsi yellowish white and numerous short white lanceolate hairs on dorsal surfaces especially of tibiae and patellae; second and third pairs yellowish white with distal two thirds of femora dark brown except dorsal surfaces and dark brown distal ends of patellae, tibiae, and metatarsi; fourth pair

with femora reddish brown except a narrow dorsal stripe, both ends of patellae reddish brown and also distal ends of tibiae and metatarsi. Abdomen: an indefinite central dorsal brownish stripe to beyond middle, then a large central brown spot anterior to anal tubercle; dorsolaterally a series of three poorly defined irregular reddish brown spots; laterally a series of narrow irregular oblique brownish stripes; venter with a broad brownish central stripe lighter through the middle and bounded on each side by a row of yellowish dots.

Type locality. Male holotype from Canal Zone Biological Area, Aug., 1936; female allotype from Porto Bello, R. P., Aug., 1936; several paratypes of both sexes from the Canal Zone Biological Area, June, 1936 and July, 1939; El Valle, R. P., July, 1936; Porto Bello, R. P., Aug., 1936.

Zygoballus maculatipes Petrunkevitch, 1925

Only known from two females, one from Soná and the other from the San Lorenzo River region of Panama. The species has not appeared in my collection thus far.

Zygoballus optatus spec. nov.

Figures 368–372

As already pointed out, this species is the one identified by Mr. Banks as *Z. rufipes* Peckham.

Male holotype. Total length 2.60 mm. Carapace 1.38 mm. long, 1.09 mm. wide at level of PLE which occupy the full width of the carapace, .83 mm. tall and, therefore, about .76 as tall as wide; thoracic part gently arched from AME to just behind PLE from which place the steep declivity continues to posterior border in the typical manner for the genus; at the top the steep declivity only slightly concave; no median thoracic groove observed.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one fifteenth of the diameter of AME. Posterior row wider than anterior row in ratio of about 10 : 9, wider than middle row in ratio of about 17 : 14. Quadrangle of laterals wider than long in ratio of 25 : 18. Total eye space occupies twenty thirty-firsts of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 15 : 8 : 2 : 7. AME nearly contiguous to one another and definitely so to ALE. Middle eyes closer

to ALE than to PLE in ratio of about 4 : 3. Height of clypeus equal to one sixth of the diameter of AME. Clypeus decorated only with a weak ventral fringe of light colored bristles, one long brownish bristle beneath outer border of each AME, a few inconspicuous loose white lanceolate hairs, and three brownish upturned bristles in lower angle between AME.

Chelicerae. Moderately porrect, divergent, and produced; basal segment .47 mm. long; a fairly robust hook on basal segment in front near distal end; with no basal boss. Fang of moderate size, rather robust in basal three fifths, then slenderer and evenly curved to tip. Fang groove distinct, considerably excavated; with two promarginal teeth, a small medial one and a robust one a short distance toward base of fang; retromargin with a small, somewhat fissidentate tooth nearly opposite the smaller of the two promarginal teeth, and a large process with ridges extending over much of the posterior surface of the basal segment a little closer to base of fang than to fissidentate tooth (a considerable degree of variation has been noted in both fissidentate tooth and the "hammer-headed" process among paratypes); these conditions shown in holotype (Fig. 368) and in a paratype (Fig. 369).

Maxillae. Parallel; longer than wide in middle in ratio of about 9 : 5; only moderately concave in middle of outer border; outer distal corner well rounded and without a tubercle or hook; scopula moderately developed along truncature.

Lip. Wider than long in ratio of 11 : 9; transversely grooved at base; well rounded distally. Sternal suture straight.

Sternum. Scutiform, quite convex; longer than wide in ratio of 13 : 10; widest between second coxae; anterior border slightly narrower than base of lip; anterior coxae wider apart than base of lip; posterior end a sharp point not extended between fourth coxae which are separated by one sixth of their width.

Legs. 1423. Tibial index of first leg 13, of fourth leg 12.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.96	.47	.77	.59	.35	3.14
2.	.64	.35	.44	.45	.31	2.19
3.	.64	.30	.37	.41	.32	2.04
4.	1.02	.45	.64	.54	.38	3.03
Palp	.46	.22	.12	—	.40	1.20

First coxae and femora moderately enlarged. All legs with a moderate supply of hair but without fringes or tufts.

Spines. First leg: femur dorsal 0–1–1–1, prolateral only distal 1; patella only prolateral 0–1–0; tibia only ventral 2–2–2, the first promarginal about one fourth from base, not well matched in pairs; metatarsus only ventral 2–2. Second leg: femur only dorsal 0–1–1–1; patella 0; tibia only ventral 0–1r–0; metatarsus as in first. Third leg: femur only dorsal distal 1; patella and tibia 0; metatarsus only retrolateral 0–1. Fourth leg: femur dorsal 0–1–1–1; patella 0; tibia only ventral 0–0–2; metatarsus prolateral 0–1, retrolateral 0–1, ventral 0–2. Palpal spines: apparently only femur dorsal distal 1.

Palp. Femur moderately bent ventrally; patella and tibia both short, with latter only a little more than half as long as former; tibial apophysis a long slender spine, gently sinuous, reaching almost to division of bulb; bulb only moderately swollen, does not overlap tibia, divided into a white anterior smaller lobule and a larger reddish brown posterior lobule; embolus arises near anterior end as a long slender filament (Figs. 370–371).

Abdomen. Rather small; ovoid, longer than wide in ratio of 11 : 7, widest near middle; with a moderately well developed dorsal shield covering practically entire dorsum; anal tubercle of moderate size; six spinnerets small, closely crowded, with anterior pair stoutest, approximated; position of colulus indicated by a tuft of black hairs; tracheal spiracle with distinct lip near base of spinnerets but no tubercle.

Color in alcohol. Carapace: almost uniformly mahogany reddish brown with a few white lanceolate hairs and slight iridescence. Chelicerae reddish brown, streaked with dark brown; maxillae and lip nearly the same with yellowish white tips. Sternum brown. Legs: first legs with coxae and trochanters brown, femora reddish brown. Patellae and tibiae yellowish white, metatarsi reddish brown, tarsi brown; second and third legs unicolorous yellowish white; fourth legs with coxae, trochanters and proximal ends of dorsal surfaces of femora yellowish white, remainder of femora reddish brown, patellae reddish brown at base but elsewhere yellowish white, tibiae yellowish white with lateral reddish brown stripes; metatarsi and tarsi brownish. Abdomen: dorsal shield reddish brown; lateral sides dark brown with a narrow oblique white bar near posterior end; venter dark brown bordered by a row of yellowish dots on each side.

Female allotype. Total length 3.71 mm. Carapace 1.66 mm. long (considerably overlapped by abdomen), 1.41 mm. wide, .96 mm. tall and, therefore, about .68 as tall as wide; other features essentially as in male.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one eighteenth of the diameter of AME. Posterior row wider than anterior row in ratio of about 13 : 11, wider than middle row in ratio of about 13 : 10. Quadrangle of laterals wider than long in ratio of about 13 : 9. Total eye space occupies about five sevenths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 18 : 9.5 : 2.3 : 9. AME barely separated from one another, from ALE by one eighteenth of their diameter. Middle row closer to ALE than to PLE in ratio of 15 : 11. Height of clypeus equal to one sixth of the diameter of AME. Clypeus decorated with a rich coat of long white lanceolate hair which shows some iridescence, two long white bristles beneath each AME, and three long upturned yellowish bristles in lower angle between AME.

Chelicerae. Fairly robust, vertical, parallel; well rounded in front where there are many short white loose scales; no basal boss observed; basal segment .57 mm. long. Fang fairly robust, evenly curved. Fang groove distinct; with two promarginal teeth, inner small, outer of moderate size; retromargin with a single typical fissidentate tooth.

Maxillae, Lip, and *Sternum.* Essentially as in male.

Legs. 4123. Tibial index of first leg 18, of fourth leg 12.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.05	.63	.77	.54	.45	3.44
2.	.83	.48	.57	.54	.35	2.77
3.	.83	.43	.51	.61	.38	2.76
4.	1.28	.60	.96	.83	.43	4.10

Spines. First leg: patella 0; elsewhere as in male except tibial and metatarsal spines more robust. Second leg: femur only dorsal 0–0–1–1; patella 0; tibia only ventral 1r–1r–1r; metatarsus as in first. Third leg: metatarsus only prolateral 0–2, retrolateral 0–1; elsewhere as in male. Fourth leg: femur dorsal 0–1–0–1; patella 0; tibia only ventral 1p–0–2; metatarsus as in male. No palpal spines observed.

Abdomen. Much more robust than in male; longer than wide in ratio of about 3 : 2, widest in middle; with no indication of a dorsal shield; other features essentially as in male.

Epigynum. Simple; with a shallow acute posterior marginal notch; main part of plate somewhat swollen through middle; near anterior border are two depressions nearly two diameters of one of them apart (Fig. 372).

Color in alcohol. Carapace: nearly uniformly reddish brown, covered by many white hairs to give a grayish appearance; eyes on black spots. Palps yellowish white. Chelicerae reddish brown; maxillae and lip much the same with whitish tips. Sternum brown. Legs: first pair with reddish brown trochanters and femora, tarsi brown, other segments yellowish white with reddish brown markings, coxae with a single small prolateral and retrolateral spot, patellae reddish brown at base and with a distal dorsal spot, tibiae with a dorsal and a prolateral stripe on each; second leg yellowish white with reddish brown markings the most important of which are a broad prolateral femoral stripe becoming a bar across tip of femur and base of patella and then continuing as a prolateral stripe to tip of tibia, also a narrow dorsal tibial stripe in distal half; other legs somewhat like second with variations. Abdomen: reddish brown with four pairs of dorsal light spots in anterior three fourths; lateral sides brown with many narrow yellowish dotted lines; venter dark brown from genital groove to base of spinnerets bounded on each side by a row of yellowish dots and bearing centrally two more rows of yellowish dots.

Type locality. Male holotype from Canal Zone Biological Area, June, 1939; female allotype from the same locality, Aug., 1936. Numerous paratypes of both sexes from: Canal Zone Biological Area, June–July, 1934; June–July, 1936; June–July, 1939; El Valle, R. P., July, 1936; Chilibre, C. Z., July, 1939; C. Z. Forest Reserve, C. Z., Aug., 1939; El Cermeno, R. P., Jan.–Feb., 1940 (Zetek).

Peckhamia Group

Genus Peckhamia Simon, 1901

Only Peckhamia variegata (F. Cambridge) has been previously known from Panama. *Peckhamia prescotti* sp. nov. must now be added to the list. The two species may be separated by the following key:

Key to the species of Peckhamia

Males

1. Palp: diameter of circle in distal part of bulb nearly half as great as length of bulb itself; embolus terminally long and slender. . . *P. prescotti* (p. 415)
1. Palp: diameter of circle in distal part of bulb about one third as great as length of bulb itself; embolus with a distinct terminal enlargement. . . . . *P. variegata*, (p. 418)

Females

1. Epigynum: plate fully twice as wide as long; with spermathecae and associated tubules confined to posterior margin..... *P. prescotti*, (p. 415)
1. Epigynum: plate much less than twice as wide as long; with spermathecae and associated tubules occupying a large part of the plate..... *P. variegata*, (p. 418)

PECKHAMIA PRESCOTTI spec. nov.

Figures 373–375

Male holotype. Total length 3.52 mm. Carapace 1.92 mm. long, 1.15 mm. wide at level of PLE which project slightly beyond margin at their position, .96 mm. tall and, therefore, .83 as tall as wide; gently arched from AME to PLE, then with a sudden descent to a groove just behind PLE, then with a nearly gradual descent to posterior border (Fig. 373); with very little difference between steep posterior declivity and that portion of the descent in front of it; surface very finely granulate.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one third of the diameter of ALE. Anterior and posterior rows about equal in width, both wider than middle row in ratio of 23 : 20. Quadrangle of laterals about as wide as long although general appearance denies this. Total eye space occupies about eleven seventeenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 16 : 7.5 : 2 : 8. AME almost contiguous, separated from ALE by one sixth of the diameter of AME. Middle eyes closer to ALE than to PLE in ratio of 6 : 11. Height of clypeus equal to one half the diameter of AME. Clypeus decorated only by scattered light colored simple hairs and three long upturned bristles in lower angle between AME.

Chelicerae. Vertical, essentially parallel; outer borders gently concave; medial borders strongly concave so that a distinct diamond-shaped opening exists between basal segments; basal segment .58 mm. long. Fang robust at base, slender and evenly curved elsewhere. Fang groove distinct; with two promarginal teeth at medial angle; a single, low, typically fissidentate tooth on retromargin.

Maxillae. Parallel; somewhat dilated distally; longer than wide in middle in ratio of 11 : 6; only slightly notched in middle of outer bor-

der; considerably excavated contiguous to lip; outer distal corner smoothly rounded.

Lip. Somewhat convex on posterior surface; longer than wide in ratio of 7 : 6; basal excavations obscure; reaches to middle of maxillae. Sternal suture essentially straight.

Sternum. Nearly diamond-shaped; longer than wide in ratio of 37 : 24, widest between second coxae where it is angular; very slightly convex; anterior border bilobed, much narrower than base of lip; posterior end slightly bilobed and not extended between fourth coxae which are nearly contiguous. Anterior coxae much the stoutest, but only slightly longer than fourth; fourth trochanter much the longest.

Legs. 412=3. Tibial index of first leg 18, of fourth leg 12.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.15	.77	.83	.57	.35	3.67
2.	.90	.43	.83	.77	.36	3.29
3.	.95	.45	.64	.90	.34	3.28
4.	1.30	.46	.96	1.13	.36	4.21
Palp	.58	.24	.08	—	.51	1.41

First leg much enlarged, with patella and tibia somewhat flattened dorsally with sharp edges along promargins and retromargins. All legs with little hair and with no fringes.

Spines. First leg: femur with only dorsal 0–0–1–0, prolateral distal 1; patella 0; tibia only ventral 2–2–2, with pairs fairly well matched and occupying only about the distal half of segment and the last pair not terminal; metatarsus only ventral 0–2–2. Second leg: femur only dorsal 0–0–1; patella 0; tibia apparently only ventral 0–1r–0; metatarsus prolateral 0–2, retrolateral 0; ventral 0–1r–0. Third leg: femur and patella as in second; tibia and metatarsus 0. Fourth leg: only femur dorsal 0–1–0; elsewhere 0. No palpal spines observed.

Palp. With the usual pattern found in Peckhamia. Femur straight; patella and tibia both short with latter about a third as long as former; tibial retrolateral apophysis a stout spur; bulb moderately swollen, with a broad tubule extending along border of bulb in a loop from base to curved embolus; embolus originates near anterior end of bulb, curves nearly through a complete circle, then continues nearly to distal end of cymbium without a terminal enlargement (Fig. 374).

Abdomen. Short and broad; longer than wide in ratio of 14 : 9,

widest two thirds from base; with a very slight constriction at end of first third; with a well developed complete dorsal shield; spinnerets short and inconspicuous; tracheal spiracle near base of spinnerets, with well chitinized lip but no true tubercle; area in front of genital groove strongly chitinized and extending laterally and dorsally nearly to dorsal shield; probably not to be considered truly pedunculate.

Color in alcohol. Carapace: generally dark brown, almost black in interocular region; a few long white lanceolate hairs from ALE and PME to ventral border; a white short band reaching from ventral border nearly to PLE which also have a few white hairs around them; this white band lies just dorsal to white second coxae and is seen well only in certain light. Legs: first leg dark reddish brown except the yellowish white tarsi and metatarsi; second leg with femur, tarsus, distal half of metatarsus, prolateral side of patella and tibia, and retrolateral side of the latter nearly black, elsewhere yellowish white; third leg with tarsi and metatarsi yellowish white, elsewhere black; fourth leg with tarsi, distal third of metatarsi and ventral sides of patellae yellowish white, elsewhere black. Chelicerae reddish brown. Sternum, lip, and maxillae dark brown, the latter two with whitish tips. Abdomen: dorsal area dark brown, lateral sides and ventrolateral regions black with very narrow yellowish stripes; venter brownish, bordered with yellowish dots.

Female allotype. Total length 3.65 mm. Carapace 1.60 mm. long, .88 mm. wide at level of PLE, .67 mm. tall and, therefore, .76 as tall as wide. Otherwise as in male.

Eyes. Seen from in front, anterior row recurved as in male. Quadrangle of laterals slightly longer than wide. Total eye space occupies three fifths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 13 : 6 : 1.75 : 6. Height of clypeus equal to five thirteenths of the diameter of AME. Otherwise as in male.

Chelicerae. Vertical, parallel; unmodified as in male (without medial excavations); basal segment .38 mm. long. Otherwise as in male.

Maxillae and *Lip.* Essentially as in male.

Sternum. Less angular than in male; mildly convex; longer than wide in ratio of 16 : 9; widest between second coxae; anterior border notched in middle, about as wide as base of lip; posterior end pointed and not extended between fourth coxae which are separated by about one fourth their diameter. Anterior coxae stoutest but posterior coxae longest, also the same with respect to fourth trochanter.

Legs. 4321. Tibial index of first leg 19, of fourth leg 10.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.72	.42	.42	.38	.26	2.25
2.	.70	.30	.51	.45	.31	2.27
3.	.70	.35	.54	.63	.25	2.47
4.	1.10	.44	.78	.83	.35	3.50

First legs somewhat enlarged but not modified to the extent seen in male.

Spines. First leg: femur and patella; 0 tibia and metatarsus essentially as in male, with spines very long, on tibia occupying distal four fifths of segment. Second leg: apparently only metatarsus ventral 0–1(middle)–0. Third and fourth legs apparently 0. Palpal spines 0.

Abdomen. Dorsal shield less extensive than in male, separated into a small anterior cap and a larger posterior part by a more marked abdominal constriction than found in male. Otherwise essentially as in male.

Epigynum. A rather large epigynal plate with two chitinized curved margins bordering a pair of yellowish white areas and separated by a narrow low septum; whole plate more than twice as wide as long; with no posterior marginal notch (Fig. 375).

Color in alcohol. In general almost identical with that of male. First legs much lighter; second coxae and trochanters white; fourth trochanter white ventrally.

Type locality. Male holotype from Canal Zone Biological Area, Aug., 1939; female allotype from Boquete, R. P., July, 1939. Numerous paratypes of both sexes from the following localities: Canal Zone Biological Area, July–Aug., 1936; June–Aug., 1939; Madden Dam, C. Z., Aug., 1939; Canal Zone Forest Reserve, C. Z., Aug., 1939; Arraijan, R. P., Aug., 1936.

Peckhamia variegata (F. Cambridge), 1900

Synageles variegata F. Cambridge, 1900
P. variegata Simon, 1901
P. variegata Simon, 1903
P. variegata Petrunkevitch, 1911
P. variegata Petrunkevitch, 1925
P. variegata Banks, 1929

Apparently only known from Panama. Numerous males and females from the following localities: Canal Zone Biological Area, June–July, 1934; June, 1936; June, Aug., 1939; Arraijan, R. P., Aug., 1936; El

Valle, R. P., July, 1936; Frijoles, C. Z., Aug., 1936; Madden Dam region, C. Z., Aug., 1939; Ft. Sherman, C. Z., Aug., 1939; Chilibre, C. Z., July, 1939.

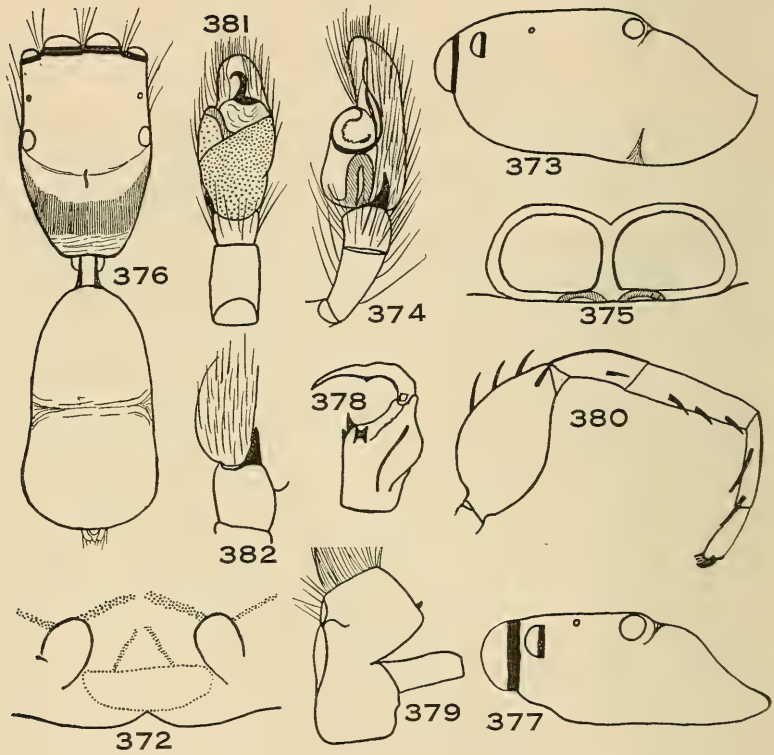
Uluella gen. nov.

Carapace moderately high, fairly long, rather flat dorsally in cephalic region, with lateral sides nearly parallel in cephalic region, widest just posterior to PLE, with a rather sharp decline just behind PLE and then with a gradual decline to beginning of steep posterior declivity which is gradual and somewhat concave; with a fairly conspicuous median longitudinal thoracic groove a little more than half-way from PLE to steep posterior declivity. *Eyes:* anterior row moderately recurved; PME about midway between ALE and PLE; PLE occupy full width of carapace; anterior and posterior rows equal in width; quadrangle of laterals considerably wider than long; total eye space occupies about half the length of the carapace. *Clypeus* practically lacking. *Chelicerae:* quite variable in males; generally somewhat porrect, somewhat divergent and mildly produced and modified in males, much less so in females; distinct fang groove with a single typical fissidentate tooth on retromargin in both sexes. *Maxillae* strongly convergent and angulate in males, less so in females. *Sternum* moderately broad, moderately convex, considerably narrowed between first coxae, widest between second. *Legs:* 1423 in males, 4132 in females; first pair with much enlarged coxae, compressed and deepened femora, not much modified elsewhere; leg spines somewhat reduced in number. *Abdomen:* pedunculate; fairly compact; somewhat constricted near middle; spinnerets of moderate size; whole body more or less ant-like. Genotype: *Uluella formosa* sp. nov.

Uluella formosa spec. nov.

Figures 376–383

This is the species identified by Mr. Banks from his collection of 1924 as *Paradamoetas formicina* Peckham. He had only a single female. This is definitely not a Paradamoetas, for reasons recorded in the description and, since it seems to have no place among the recognized genera, a new one has been created for it. It may be considered ant-like because of its somewhat pedunculate abdomen, the definite



External Anatomy of Spiders

Fig. 372. *Zygoballus optatus* Chickering; epigynum, ventral view.
Fig. 373. *Peckhamia prescotti* Chickering; male carapace, lateral view.
Fig. 374. *P. prescotti* Chickering; male palp, retrolateral view.
Fig. 375. *P. prescotti* Chickering; epigynum, ventral view.
Figs. 376–377. *Uluella formosa* Chickering; male body, dorsal view; carapace, lateral view.
Figs. 378–379. *U. formosa* Chickering; male chelicera and maxilla.
Fig. 380. *U. formosa* Chickering; first leg, prolateral view.
Figs. 381–382. *U. formosa* Chickering; male palp, ventral view; and palpal tibia, retrolateral view.

constriction in the abdomen, and a kind of pseudoconstriction in the carapace.

Male holotype. Total length 3.46 mm. Carapace 1.79 mm. long, .98 mm. wide just behind PLE which occupy slightly less than the full width of the carapace at their level, .75 mm. tall and, therefore, nearly .77 as tall as wide; ascent gradual from AME to PLE, then with a sudden slight drop, and further very gentle decline to the steep posterior declivity which is somewhat concave and which begins about two fifths of the distance from PLE to posterior border (Figs. 376-377); sides of cephalic part nearly vertical, slightly widened from ALE to just behind PLE from which the thoracic part gradually narrows so that width of carapace contiguous to pedicel is rather less than usual; mildly constricted behind PLE with constriction extending in an arch back to short longitudinal thoracic groove which lies at slightly more than halfway from PLE to beginning of steep declivity; surface finely granulate, especially in interocular area and along posterior declivity.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one ninth of the diameter of AME. Anterior row only slightly wider than posterior row, wider than middle row in ratio of 47 : 41. Quadrangle of laterals wider than long in ratio of 47 : 32. Total eye space occupies twenty-one fortieths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 18 : 7.5 : 1.5 : 7. AME contiguous with one another and with ALE. Middle eyes equidistant from ALE and PLE. Clypeus lacking. Only one long upturned brownish bristle in lower angle between AME.

Chelicerae. A considerable degree of variation occurs in length and general development of these organs among the paratypes. The holotype is not one with the greatest development. Somewhat porrect, somewhat divergent, strongly geniculate at base in front; considerably excavated medially in distal half; very angulate, with strongly chitinized edges along lateral dorsal margin; basal segment .45 mm. long. Fang quite sinuous, with a low tooth about the middle of inner margin. Fang groove distinct, excavated in middle; with two promarginal teeth at inner end of groove, the innermost very small, the other fairly robust; retromargin with a typical fissidentate robust tooth and a low irregular ridge extending to base of fang (Fig. 378).

Maxillae. Slightly convergent; longer than wide in middle in ratio of 45 : 17; considerably excavated contiguous to lip; quite deeply notched in middle of outer border; outer distal corner with a small tooth directed forward; with well developed scopula along truncature;

palp inserted into second quarter from base (Fig. 379).

Lip. Longer than wide in ratio of 13 : 10; moderately convex on posterior surface; basal excavations reach about one third the length of the organ; reaches a little beyond middle of maxillae. Sternal suture gently procurved.

Sternum. Longer than wide in ratio of about 2 : 1; moderately convex; anterior border somewhat narrower than base of lip; widest between second coxae from which place it gradually narrows to a point not extended between fourth coxae which are separated by about one fifth of their diameter. First coxae much enlarged and twice as long as any other.

Legs. 1423. Tibial index of first leg 16, of fourth leg 11.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.96	.60	.70	.54	.35	3.15
2.	.71	.43	.43	.45	.29	2.31
3.	.69	.37	.41	.44	.34	2.25
4.	.89	.45	.70	.58	.32	2.94
Palp	.58	.19	.16	—	.45	1.38

First coxae much enlarged; first femora compressed laterally and greatly deepened (Fig. 380); other segments not notably modified.

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral only distal 1; patella only prolateral 0–1–0; tibia only ventral 2–2–2; metatarsus only ventral 0–2–2. Second leg: femur dorsal 0–1–1–1, prolateral and retrolateral distal 1; patella 0; tibia only ventral 1r–1r–0, with second very long; metatarsus as in first. Third leg: femur as in second; patella and tibia 0; metatarsus only prolateral and retrolateral 0–1, but with a ventral comb. Fourth leg: femur as in second except prolateral lacking; patella and tibia 0; metatarsus as in third. Palpal spines: only femur dorsal 0–0–1–1.

Palp. Femur considerably bent ventrally; both patella and tibia short, with the former about one fifth longer than the latter; tibial retrolateral apophysis a stout spur of moderate length directed straight forward; bulb moderately swollen, overlaps tibia about the length of the latter; embolus a short, fairly stout spine turned ventrally and somewhat retrolaterally (Figs. 381–382).

Abdomen. Pedunculate (Fig. 376); longer than wide in ratio of about two to one; widest about three fourths from base where it is somewhat dilated; mildly constricted near middle; anal tubercle an inconspicuous short flattened cone; six spinnerets with anterior pair

short and approximated, posterior pair slender but only a little longer and spread widely so that middle pair is plainly revealed, middle pair the slenderest but about as long as posterior pair. Position of colulus indicated by a tuft of black hairs; tracheal spiracle near base of spinnerets, with distinct lip but no tubercle.

Color in alcohol. Carapace: dark brown with waxy appearance, nearly black in interocular area; with a moderate supply of clear iridescent scales and a few white lanceolate hairs over at least most of the cephalic part; an incomplete narrow white bar extends from the interval between first and second coxae over the mild constriction, thus accentuating the depth of the constriction. Chelicerae brown. Maxillae and lip brown with yellowish tips. Sternum brown. Legs: first pair with brown coxae, trochanters and femora, patellae and tibiae lighter with dorsal surfaces yellowish, metatarsi dark brown, tarsi yellowish, all segments with many white scales especially on prolateral surfaces; second pair with coxae almost white, femora brown, tarsi yellowish white and patellae, tibiae and metatarsi reddish brown laterally and yellowish white elsewhere; third pair much like second; fourth pair nearly all reddish brown except the white coxae and yellowish white tarsi with reddish brown lateral stripes. Abdomen: with many iridescent scales; nearly black at base, lateral sides and venter; dorsum brownish; on each lateral side about two thirds from base is a narrow, white, gently recurved bar and a small, faintly indicated light spot about one third from base.

Female allotype. Total length 4.29 mm. Carapace 1.92 mm. long, 1.09 mm. wide just behind PLE which occupy almost entire width of carapace, .75 mm. tall and, therefore, about .69 as tall as wide. Other features essentially as in male.

Eyes. Seen from in front, anterior row recurved as in male. Width of three rows essentially as in male. Quadrangle of laterals wider than long in ratio of 50 : 37. Total eye space occupies one half the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 18 : 8 : 1.5 : 7. Middle eyes definitely but slightly closer to ALE than to PLE. Height of clypeus equal to nearly one ninth of the diameter of AME. Clypeus decorated with a fringe of ventral brown bristles, two or three long brown bristles beneath each AME, and three long upturned brown bristles in lower angle between AME.

Chelicerae. Moderately robust, very strongly swollen obliquely in middle in front about one third from base; moderately excavated medially; with a strongly chitinized ridge in position of basal boss; basal segment .46 mm. long. Fang of moderate size, evenly curved.

Fang groove with two promarginal teeth and a single fissidentate retromarginal tooth as in male.

Maxillae. Essentially as in male except they are less angular and have no tubercle or tooth at outer distal corner.

Lip. Essentially as in male.

Sternum. Essentially as in male except somewhat narrower; longer than wide in ratio of 19 : 9. Fourth coxae separated by one half their width.

Legs. 4132. Tibial index of first leg 19, of fourth leg 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.83	.54	.64	.43	.32	2.76
2.	.64	.35	.45	.40	.28	2.12
3.	.70	.44	.38	.44	.32	2.28
4.	.96	.45	.70	.58	.38	3.07

First pair enlarged as in male. Palps with a curious decoration of long white lanceolate hairs; patella with many of these hairs but apparently the arrangement is irregular; tibia with two more or less complete whorls of erect lanceolate hairs; tarsus with one whorl and other hairs irregularly placed, also with a black prolateral fringe.

Spines. First leg: as in male with tibial and metatarsal spines robust and long. Second leg: femur apparently only with three distals, one each on dorsal, prolateral, and retrolateral surfaces; patella 0; tibia only ventral 1r–1r–1r, middle one very long; metatarsus only ventral 2–2. Third leg: femur as in second; patella and tibia 0; metatarsus as in male. Fourth leg: femur dorsal 1–1–1, prolateral and retrolateral distal 1; elsewhere as in male. Palpal spines: apparently only femur dorsal 0–0–1.

Abdomen. Essentially as in male.

Epigynum. Epigynal plate about as long as wide; apparently with no posterior marginal notch but a lip a short distance in front of the margin; near the center are two depressions a little more than a diameter of one of them apart; anterior to these are two curved chitinous plates (Fig. 383).

Color in alcohol. Very nearly like that of male. Legs somewhat lighter. Abdomen: dorsum with four nearly black bars in anterior two thirds; in center of the constriction is a short bar, broad in middle but narrowed laterally; in front of this is a narrow recurved bar and behind it is another broad and longer bar extending over to lateral sides;

laterally with two white spots on each side and a rounded black spot at the posterior dilation.

Type locality. Male holotype from Canal Zone Biological Area, July, 1939; female allotype from the same locality, Aug., 1939. Numerous paratypes of both sexes from the following localities: Canal Zone Biological Area, Aug., 1936; June–July, 1939; El Valle, R. P., July, 1936; Madden Dam region, C. Z., Aug., 1939; Boquete, R. P., July, 1939.

Zuniga Group

Key to the genera in the Zuniga Group

1. First leg much enlarged and chelate; first tibia with well developed black ventral fringe. Eyes: PME equidistant from ALE and PLE; quadrangle of laterals about two thirds as long as wide; total eye space occupies slightly less than half the length of the carapace. Carapace: not constricted; with no marked drop between PLE and posterior steep declivity. . . . . *Chirothecia*, (p. 426)
1. Not with combination of characters given above. 2
2. First leg enlarged but not notably chelate; without a ventral fringe. Eyes: PME considerably closer to ALE than to PLE; quadrangle of laterals considerably wider than long; total eye space occupies about half the length of the carapace. Carapace: not constricted; with a more or less definite flat platform from PLE to posterior steep declivity . . . . *Descanso*, (p. 430)
2. Not with combination of characters given above. 3
3. (Only female known) First leg not enlarged and without a ventral fringe. Eyes: PME considerably closer to ALE than to PLE; quadrangle of laterals considerably wider than long; total eye space occupies slightly less than half the length of the carapace. Carapace: without constriction; without a definite platform between PLE and posterior declivity; in profile, however, with two regions of steep descent behind PLE. . . . . *Donatinus*, (p. 439)
3. Not with combination of characters given above. 4
4. First leg enlarged, moderately chelate and with a black ventral fringe on tibia. Eyes: PME much closer to ALE than to PLE; quadrangle of laterals somewhat wider than long; total eye space occupies considerably more than half the length of the carapace. Carapace: without constriction; almost flat from AME to steep posterior declivity which begins half-way from PLE to posterior border. . . . . *Sebastira*, (p. 442)
4. First leg not enlarged, without ventral fringe. Eyes: PME about half-way between ALE and PLE or somewhat closer to ALE; quadrangle of laterals considerably wider than long; total eye space occupies half or less than half the length of the carapace. Carapace: more or less constricted behind PLE; strongly convex in the same region. . . . . *Zuniga*, (p. 447)

Genus Chirothecia Taczanowski, 1878

Chirothecia modesta spec. nov.

Figures 384–391

Male holotype. Total length 3.97 mm. Carapace 1.82 mm. long, 1.16 mm. wide at widest place, a little behind PLE; lateral sides considerably rounded; third row of eyes occupy twenty-four twenty-sevenths of width of carapace; no thoracic groove visible; surface finely granular; rather low; rises very gently from AME to PLE, then drops slightly for about half the way to posterior border from which the descent is steep and slightly concave (Figs. 384–385); slightly depressed posterior and lateral to PLE; .71 mm. tall and, therefore, a little more than seven twelfths as tall as wide.

Eyes. Seen from in front, anterior row strongly recurved with dorsal borders of ALE slightly above those of AME. Posterior row wider than anterior row in ratio of 48 : 43. Middle row almost as wide as anterior row. Quadrangle of laterals about two thirds as long as wide. Total eye space occupies a little less than half the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 15 : 6.5 : 1.75 : 6. AME almost touching one another, separated from ALE by about one fifteenth of their diameter. Eyes of second row equidistant from ALE and PLE. Height of clypeus about two fifteenths of the diameter of AME.

Chelicerae. Somewhat divergent, moderately produced, considerably modified and excavated along fang groove. Fang thickened in basal third which has a blunt prolateral tooth, distal two thirds slender and fairly evenly curved. Fang groove deeply excavated; with a single large blunt promarginal tooth and a small one on the medial side of the larger; a slender single retromarginal tooth (Fig. 386).

Maxillae. Parallel; longer than wide in middle in ratio of about 2 : 1; quite concave along outer margin; considerably widened distally and drawn out into a distinctly flattened platelike lateral angle; distinctly gibbous along retrolateral surface in distal half; with a fairly well developed black scopula along truncature.

Lip. Longer than wide in ratio of about 3 : 2; well rounded along distal border; with basal excavations reaching a full one third of its length. Sternal suture straight.

Sternum. Anterior border narrower than base of lip; longer than wide in ratio of 19 : 11; widest between second coxae; with a distinct space between second and third coxae; ends bluntly at posterior end

which is not extended between fourth coxae which are separated by three tenths of their diameter.

Legs. 4=132. Tibial index of first leg 22, of fourth leg 11.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.00	.61	.73	.73	.37	3.44
2.	.78	.43	.50	.48	.31	2.50
3.	.83	.38	.49	.54	.29	2.53
4.	1.10	.49	.84	.67	.33	3.43
Palp	.60	.18	.09	—	.60	1.47

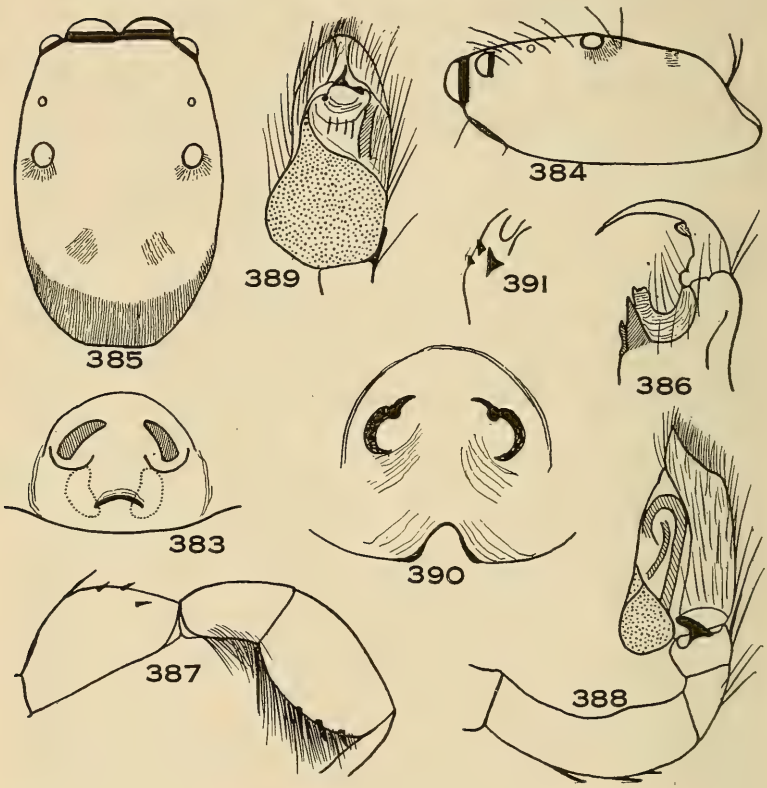
First femur, patella and tibia much thickened and laterally compressed; first coxa and trochanter also enlarged; first tarsi and metatarsi slender (Fig. 387). First tibia with a heavy black ventral fringe; first patella with a small ventral black fringe and white scales on prolateral side.

Spines. First leg: femur dorsal 0–0–1–1–1–0 and prolateral distal 1; patella 0; tibia only ventral 2–2–2, crowded into distal three sevenths of segment, those along promargin longer than those along retromargin; metatarsus only ventral 0–2–2, all in distal half of segment. Second leg: femur and patella as in first; tibia only ventral 0–1–1–0, with both in middle of segment; metatarsus only prolateral 0–1, ventral 1r–1r. Third leg: femur and patella as in first; tibia 0; metatarsus only prolateral 0–2, retrolateral 0–1. Fourth leg: apparently as in third.

Palp. Femur considerably curved and somewhat twisted, with dorsal spines 0–0–1–1; both patella and tibia short, the latter broader than long; tibial apophysis a stout ventrally curved spur; bulb much swollen, with a short, nearly straight spine at anterior end (Figs. 388–389).

Abdomen. Somewhat pedunculate; somewhat constricted about one third from base; widest about two thirds from base; posterior end bluntly rounded; longer than wide in ratio of 18 : 11. Anal tubercle short and flattened; all spinnerets short, the anterior pair most robust, the posterior pair a little longer and slenderer, middle pair the shortest and smallest; colulus visible as a tuft of dark bristles; tracheal spiracle apparently near base of spinnerets.

Color in alcohol. All appendages generally dark colored: first coxae and trochanters amber with dark streaks, other coxae and trochanters yellowish with black prolateral stripes; first femora dark brown with many loose white scales; second femora white dorsally and ventrally



External Anatomy of Spiders

Fig. 383. *Uluella formosa* Chickering; epigynum, ventral view.
Figs. 384–385. *Chirothecia modesta* Chickering; male carapace, lateral and dorsal views.
Fig. 386. *C. modesta* Chickering; male chelicera.
Fig. 387. *C. modesta* Chickering; first leg, prolateral view.
Figs. 388–389. *C. modesta* Chickering; male palp, retrolateral view; palpal tarsus, ventral view.
Fig. 390. *C. modesta* Chickering; epigynum, ventral view.
Fig. 391. *C. modesta* Chickering; female cheliceral teeth.

but black on prolateral and retrolateral sides; third and fourth femora only with narrow white dorsal stripes, elsewhere nearly black; first patellae and tibiae dark brown except the white scales on prolateral side of patellae; second patellae and tibiae all brownish except the black prolateral stripes; third patellae and tibiae light above and below, black prolaterally and retrolaterally; fourth patellae and tibiae mostly black with a very narrow white stripe along retromargin of dorsal surfaces and a ventral yellowish stripe; first two pairs of metatarsi and tarsi amber colored; third pair of metatarsi and tarsi with black prolateral stripe on metatarsi, elsewhere yellowish; fourth pair of metatarsi and tarsi mostly black. Carapace black with many loose white scales; sternum gray. Abdomen nearly black with faintly indicated narrow light colored band in the constriction and many small iridescent scales particularly in region of constriction; venter grayish brown.

Female allotype. Total length 4.67 mm. Carapace 1.75 mm. long, 1.06 mm. wide a little behind PLE; lateral sides not as rounded as in male and relatively not quite as wide. Otherwise as in male.

Chelicerae. Parallel, vertical; not highly modified as in male; much swollen in front from near basal medial corner to near base of fang; apparently a well developed boss. Fang slender and evenly curved. Fang groove with two promarginal teeth, the inner one small; a single, fairly robust, retromarginal tooth (Fig. 391).

Eyes, Maxillae, Lip, and *Sternum.* Essentially as in male.

Legs. 4132. Tibial index of first leg 23, of fourth leg 12.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.79	.51	.56	.47	.27	2.60
2.	.71	.40	.38	.38	.27	2.14
3.	.71	.34	.44	.45	.34	2.28
4.	1.00	.45	.79	.55	.36	3.15

Spines. Second tibiae with ventral spines 0–1–1–1. Otherwise essentially as in male.

Abdomen. No constriction present as in male. Otherwise as in that sex.

Epigynum. Rather closely similar to those in many species of Metaphidippus. With a deep posterior marginal notch; just in front of notch appears a swollen transverse region; still further anteriorly are two shallow depressions with comma-shaped outer margins (Fig. 390).

Color in alcohol. Strikingly similar to that of male.

Type locality. Male holotype, female allotype, and one male paratype from Boquete, R. P., July, 1939.

Genus Descanso Peckham, 1892

Simon ('01) placed Descanso in his Unidentati with Chirothecia, Sebastira, etc. One species from Panama which I have placed in this genus also has a single tooth on the retromargin of the fang groove, but the other one is in some doubt because it seems to be transitional between the two types. The three species from Hispaniola recently placed in the genus by Miss Bryant ('43) all have a fissidentate tooth.

Key to the species of Descanso from Panama

Males

1. With a definite semicircular platform behind PLE. Retromargin of fang groove with a single tooth which is only obscurely fissidentate. Palp: tarsus excavated basally and with a retrolateral basal pointed process; embolus distinctly spiral at distal end of bulb..... *D. peregrinus*, (p. 435)
1. With a much less definite platform behind PLE. Retromargin of fang groove with a single, simple, fairly robust tooth. Palp: tarsus not excavated basally and without a basal retrolateral process; embolus a short, moderately robust spine arising from anterior border of bulb.. *D. insolitus*, (p. 430)

Females

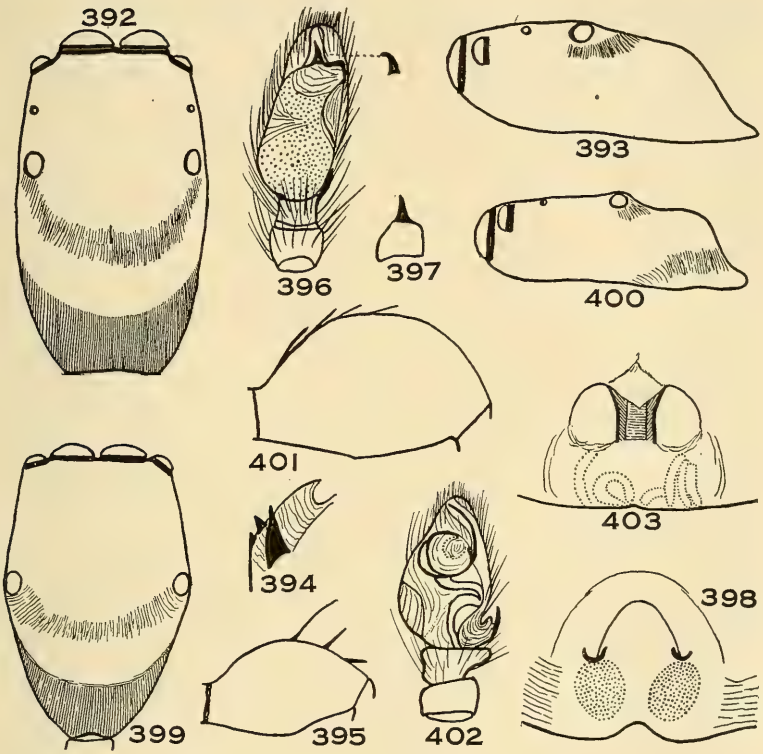
1. With a definite semicircular platform behind PLE. Epigynum: with a slight posterior marginal notch; with two deep oval depressions in anterior half of plate, separated by a distinct septum..... *D. peregrinus*, (p. 435)
1. With a much less definite platform behind PLE. Epigynum: with a well defined posterior marginal notch; near middle of plate are two small procurved semicircular depressions connected by a long, strongly recurved arch..... *D. insolitus*, (p. 430)

Descanso insolitus spec. nov.

Figures 392–398

Mr. Banks had one male from the Canal Zone Biological Area, June, 1924, but he did not describe it.

Male holotype. Total length 3.84 mm. Carapace 1.92 mm. long, 1.21 mm. wide at some distance behind PLE which occupy forty-five



External Anatomy of Spiders

Figs. 392–393. *Descanso insolitus* Chickering; female carapace, dorsal view; male carapace, lateral view.

Figs. 394–395. *D. insolitus* Chickering; male cheliceral teeth; and first femur, lateral view.

Figs. 396–397. *D. insolitus* Chickering; male palp, ventral view; palpal tibia, retrolateral view.

Fig. 398. *D. insolitus* Chickering; epigynum, ventral view.

Figs. 399–400. *D. peregrinus* Chickering; male carapace, dorsal and lateral views.

Fig. 401. *D. peregrinus* Chickering; first femur of male, lateral view.

Fig. 402. *D. peregrinus* Chickering; male palp, ventral view.

Fig. 403. *D. peregrinus*, Chickering; epigynum, ventral view.

fifty-seconds of width at their level, .64 mm. tall and, therefore, slightly more than half as tall as wide; general form similar to that of *D. chapoda* Peckham to which I consider the species closely related; interocular area gently convex; ascent very gentle from AME to PLE, then with a rather steep decline to a very gently declined platform, then the steep posterior declivity, which is gently concave, proceeds to posterior border; dorsal surface beaded but not as conspicuously as in *D. peregrinus* sp. nov.; with a short median longitudinal thoracic groove about half-way from posterior border of PLE to steep declivity (Figs. 392–393).

Eyes. Viewed from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one sixteenth of the diameter of AME. Posterior row wider than anterior row in ratio of 45 : 42. Middle row shorter than anterior row in ratio of 20 : 21. Quadrangle of laterals wider than long in ratio of 45 : 32. Total eye space occupies five elevenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 14.5 : 6.75 : 2.25 : 7. AME separated from one another by one fifteenth of their diameter, from ALE by about the same distance. Middle eyes closer to ALE than to PLE in ratio of about 4 : 5. Height of clypeus equal to one seventh of diameter of AME. Clypeus decorated with: long whitish hairs, the longest of which arise beneath AME and converge toward and overlap in the middle line, and also project over bases of chelicerae; a few white scale-like hairs along ventral margin; three stiff whitish bristles in lower angle between AME; whitish scales around AME.

Chelicerae. Slightly porrect, essentially parallel, slightly produced; basal segment .49 mm. long; swollen in a broad ridge from basal medial corner to distal outer corner. Fang rather long and slender, somewhat irregular along outer margin. Fang groove somewhat excavated; promargin with two small teeth, the medial one very minute; retromargin with a single, simple, long, pointed, fairly robust tooth (Fig. 394).

Maxillae. Parallel; longer than wide in middle in ratio of about 5 : 2; deeply concave along outer border; partly hidden by enlarged first coxae; somewhat dilated distally and somewhat excavated contiguous to lip.

Lip. Longer than wide in ratio of about 5 : 4; distal end about two thirds as broad as base; partly hidden by first coxae. Sternal suture probably straight but partly hidden by enlarged first coxae.

Sternum. Longer than wide in ratio of 19 : 10; probably widest between second coxae but anterior half partly hidden by first and second

coxae. First coxae separated by one fourth the maximum width of sternum. Posterior end a blunt point not extended between fourth coxae which are almost in contact.

Legs. 1432. Tibial index of first leg 17, of fourth leg 16.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.00	.71	.71	.60	.33	3.35
2.	.75	.45	.44	.45	.31	2.40
3.	.80	.40	.44	.51	.31	2.46
4.	1.02	.47	.62	.62	.31	3.04
Palp	.58	.20	.11	—	.51	1.40

First much the stoutest but not as greatly enlarged as in D. peregrinus sp. nov. (Fig. 395). First patella and tibia with light colored weak fringes along retrolateral and prolateral surfaces; in certain light these show considerable iridescence; first tibia also with a weak fringe of black hair on ventral side.

Spines. First leg: femur dorsal 0–0–1–1–1, regularly diminishing in size toward distal end, prolateral distal 1; patella 0; tibia only ventral 0–2–2–2; metatarsus only ventral 0–2–2; all tibial and metatarsal spines robust and arising from raised bases. Second leg: femur and patella as in first; tibia only ventral 0–1r–2; metatarsus only ventral 0–1r–2. Third leg: femur and patella essentially as in first except retrolateral distal 1; tibia prolateral and retrolateral 0–1–0, ventral 0–0–1p; metatarsus prolateral 0–2, retrolateral 0–1, ventral 0–2. Fourth leg: femur and patella as in third; tibia only ventral 1p–1p–2; metatarsus prolateral 1–1; retrolateral 0–1, ventral 0–2. Palpal spines: only femur dorsal 0–0–1–1–1.

Palp. Femur considerably curved, with a few dorsal white iridescent scales; both patella and tibia short, with former longer than latter in ratio of slightly less than 2 : 1; tibial retrolateral apophysis a simple, fairly stout spur; bulb much swollen, overlapping tibia considerably; embolus a short stout spine curved ventrally (Figs. 396–397).

Abdomen. Almost perfectly oval in outline; longer than wide in ratio of 87 : 54; widest about three fifths from base; not notably pedunculate; without a scutum; without a definite constriction, but about one third from base is a narrow band formed by cessation of small light colored iridescent scales, dark pigment, and black bristles which seems to simulate a constriction; anterior spinnerets robust, short; posterior spinnerets longer by terminal segment, not widely spread apart; middle spinnerets mostly hidden, slender and about as

long as anterior pair. Anal tubercle a fairly prominent, short, broad cone. Position of colulus indicated by a small tuft of bristles. Tracheal spiracle near base of spinnerets, without tubercle.

Color in alcohol. Palp: femur yellowish, streaked with gray laterally and reddish distally; tibia, patella and base of cymbium streaked with reddish; remainder of cymbium yellowish. Lip and maxillae amber color. Chelicerae brownish amber. Legs: first coxae light amber with white scales on retrolateral surfaces, other coxae yellowish white, third and fourth with dark prolateral stripes; other segments mostly brown of different shades, femora dark with some iridescence and white scales, first metatarsi yellowish white, second metatarsi and tarsi also yellowish white; on third and fourth legs white scales and reddish brown color form more or less definite stripes. Carapace: brown with all but posterior declivity and lateral sides covered with slender whitish procumbent scales; on ventral margin opposite third coxae a narrow stripe of whitish scales arises and passes back to near middle where it arches up the posterior declivity about half-way. Abdomen: brownish with small whitish scales with some iridescence covering entire dorsum except the pseudoconstriction already noted; epigastric plate brownish gray; a large white procurved spot behind genital groove; elsewhere dark brownish gray.

Female allotype. Total length 4.16 mm. Carapace 2.06 mm. long, 1.21 mm. wide, .71 mm. tall; perhaps slightly more convex in interocular region than in male, but otherwise as in that sex.

Eyes. Posterior row wider than anterior row in ratio of 47 : 42. Quadrangle of laterals wider than long in ratio of 47 : 32. Total eye space occupies nineteen forth-sixths of length of carapace. Otherwise as in male.

Chelicerae. Basal segment .45 mm. long, less swollen in front than in male, slightly excavated medially, fang groove less deeply excavated than in male but fang and teeth essentially as in that sex.

Maxillae, Lip, and *Sternum.* Essentially as in male.

Legs. 4123. Tibial index of first leg 25, of fourth leg 16.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.89	.67	.62	.45	.31	2.94
2.	.71	.48	.44	.42	.33	2.38
3.	.78	.36	.40	.51	.33	2.38
4.	1.02	.57	.71	.64	.36	3.30

First leg enlarged and fringed essentially as in male.

Spines. First leg as in male. Second leg: femur and patella as in

male; tibia only ventral 0–1r–1r. Third leg: femur and patella as in male; tibia as in male except the single retrolateral seems to be lacking; metatarsus as in male. Fourth leg :femur and patella as in male; tibia only ventral 1p–0–2; metatarsus as in male except ventral 0–1p. Palpal spines: only dorsal distal 1.

Abdomen. Slightly damaged but apparently as in male.

Epigynum. A simple, strongly chitinized plate; a fairly deep posterior marginal notch; near middle are two small procurved semicircular depressions connected by a long recurved arch (Fig. 398).

Color in alcohol. As in male except on abdomen. Abdomen: dark gray dorsally and laterally; venter with the white spot just behind genital groove larger and extended to a narrow central stripe beyond the middle which reaches to base of spinnerets with some gray flecks included.

Type locality. Male holotype from Ft. Sherman, C. Z., Aug., 1939; female allotype from Canal Zone Biological Area, July, 1939. One male paratype from El Valle, R. P., July, 1936.

Descanso peregrinus spec. nov.

Figures 399–403

Male holotype. Total length 3.15 mm. Carapace 1.64 mm. long, 1.02 mm. wide at level of PLE which occupy almost the entire width of carapace, .51 mm. tall and, therefore, one half as tall as wide; general form very similar to *D. vagus* Peckham; interocular area almost flat; behind PLE there is a sharp drop to a semicircular platform with a very regular outer margin; a shallow groove just behind and, for a short distance, below PLE; the last seventh of the total length is occupied by the steep posterior declivity (Figs. 399–400); whole surface finely beaded in short irregular rows; no thoracic groove present.

Eyes. Viewed from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one sixth of the diameter of ALE. Anterior row narrower than posterior row in ratio of 38 : 45. Middle row slightly narrower than anterior row. Quadrangle of laterals wider than long in ratio of about 9 : 7. Total eye space occupies a little less than four sevenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 11.5 : 6 : 1.5 : 5.5. AME separated from one another by one twelfth of their diameter, from ALE by one sixth of their diameter. Middle eyes closer to ALE than to PLE in ratio of nearly 1 : 2. Height of clypeus equal to one third of the

diameter of AME. Anterior row set far out anterior to clypeus so the latter is strongly receding. Clypeus decorated with numerous white hairs which sparsely fill the space beneath ALE and the whole clypeus is covered with longer white hair converging toward middle line and there overlapping medially; also with two stiff bristles in lower angle between AME (the third may be broken off).

Chelicerae. Vertical, slightly convergent, rather small; not produced but deeply excavated medially so that a large round opening exists between the two basal segments. Fang rather slender, evenly curved. Fang groove difficult to see without serious injury to specimen; apparently with a strongly chitinized ridge on promargin with two small teeth on it; retromarginal tooth appears to be a low fissidentate biscuspid tooth but its true condition is uncertain.

Maxillae. Essentially parallel; longer than wide in middle in ratio of about 3 : 2; very gently concave along outer margin; moderately dilated distally: with outer distal corner smoothly rounded.

Lip. About as long as wide; somewhat hidden by enlarged first coxae. Sternal suture straight and narrow.

Sternum. General shape an elongated oval; longer than wide in ratio of 7 : 4; widest opposite second coxae; anterior border five sixteenths as wide as maximum width; posterior end pointed and not extended between fourth coxae which are separated by only about one eleventh of their width.

Legs. 4132. Tibial index of first leg 26, of fourth leg 20.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.66	.42	.47	.36	.20	2.11
2.	.55	.31	.38	.33	.20	1.77
3.	.58	.32	.35	.38	.22	1.85
4.	.70	.42	.47	.48	.24	2.31
Palp	.40	.16	.10	—	.46	1.12

First leg very stout; coxa, femur, patella and tibia especially enlarged; femur .40 mm. wide in middle, strongly arched dorsally and compressed laterally (Fig. 401); tibia and patella somewhat flattened dorsally.

Spines. First leg: femur only with a row of four short spines beginning near crest of dorsal arch and extending diagonally across to end on the prolateral position at distal end; patella 0; tibia only ventral 2–2–2; metatarsus only ventral 2(displaced prolaterally)–2. Second leg: femur and patella as in first except that femoral spines appear to be three; tibia only ventral 1r–0–2; metatarsus probably only ventral

2–2, both small. Third leg: femur dorsal 0–1–1, prolateral 0–0–1–0, retrolateral distal 1; patella 0; tibia only ventral 0–0–1p; metatarsus only ventral 1p–1p. Fourth leg: femur apparently only prolateral and retrolateral distal 1; patella and tibia as in third; metatarsus only ventral 0–1p. Palpal spines: only femur dorsal 0–1–1–1.

Palp. Femur straight, with a few whitish hairs on dorsal distal half of segment; both patella and tibia short but former longer in ratio of 8 : 5; tibia rounded out distally and excavated in correspondence, apparently, with an unusual development of bulb and cymbium; tarsus excavated basally at retrolateral corner and with a process which appears to be from the base of bulb and passes out close to distal rim of tibia, and continues into a slender pointed process lying close to a short rounded apophysis modified from that part of the cymbium; embolus is twisted into two full turns of a spiral at distal end of bulb (Fig. 402).

Abdomen. Almost perfectly oval in outline; longer than wide in ratio of 13 : 8; 1.66 mm. long; widest about three fifths from base; doubtfully pedunculate in usual sense of that term; with a complete scutum covering dorsum, most of lateral sides, and base; anal tubercle partly hidden beneath scutum but plainly a short broad cone; spinnerets short and inconspicuous, anterior pair most robust, posterior pair slender and longest by terminal segment, set quite far apart to expose to view the middle pair which is also slender. Position of colulus uncertain. Tracheal spiracle close to base of spinnerets and guarded by a chitinized plate of moderate size; a chitinized plate covers nearly entire area on venter anterior to genital groove; a central basal stripe appears to be more strongly chitinized than remainder of venter.

Color in alcohol. Chelicerae light brownish. Maxillae light yellowish with gray streaks. Lip grayish over a yellowish background and with yellowish distal border. Palp brownish with gray streaks; bulb, cymbium and tibial rim dark brown. Sternum dark brown. Legs: generally different shades of brown with a finely beaded surface and a few white appressed hairs; first and third coxae dark, second and fourth light amber; all femora dark on lateral sides, lighter above; second tarsi and metatarsi nearly black, others light amber; other segments with varied shades of amber. Carapace: a rich dark mahogany brown, still darker in interocular area; everywhere except on lateral sides of posterior declivity with a rather sparse covering of appressed whitish hairs; dorsal side of second coxae covered with white iridescent scales continuous with a conspicuous but short diagonal bar directed backward and upward covered with the same kind of white iridescent scales;

fourth coxae also with a few white scales with iridescence on dorsal side but these are not continued onto carapace. Abdomen: also a rich mahogany brown dorsally; slender white scales sparsely cover the anterior fourth, at posterior margin of this scaled area there is a narrow band devoid of scales simulating, to some extent, a constriction; behind the pseudoconstriction abdomen is covered by a few white scales, more numerous at sides in anterior half, and many short recumbent light colored hairs; venter grayish with central part somewhat amber colored from presence of more chitin.

Female allotype. Total length 3.90 mm. Carapace 1.70 mm. long, 1.08 mm. wide at level of PLE which occupy slightly more than width of carapace at that level, .64 mm. tall and, therefore, about .60 as tall as wide; otherwise essentially as in male.

Eyes. Viewed from in front, anterior row recurved about as in male; anterior row narrower than posterior row in ratio of about 4 : 5. Middle row as in male. Quadrangle of laterals wider than long in ratio of 10 : 7. Total eye space occupies twenty thirty-ninths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 12 : 6 : 2 : 6. AME seem to be almost in contact, separated from ALE by one eighth of their diameter. Middle eyes closer to ALE than to PLE in ratio of 4 : 9. Height of clypeus equal to five twelfths of the diameter of AME. Three stiff bristles in lower angle between AME. Otherwise as in male.

Chelicerae. Rather small, vertical, slightly convergent, slightly excavated at base, partly hidden by overlapping maxillae; fang fairly long and slender, evenly curved; fang groove with two small promarginal teeth and a single fissidentate retromarginal tooth of moderate size (fang groove studied in paratype to avoid injury to holotype).

Maxillae. Longer than wide in ratio of 2 : 1; deeply but narrowly notched in outer margin; broadened distally but not dilated; outer distal corner with a slight protuberance.

Lip and *Sternum.* Essentially as in male except posterior coxae separated by one sixth of their width.

Legs. 4132. Tibial index of first leg 26, of fourth leg 18.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.62	.40	.38	.35	.22	1.97
2.	.55	.31	.38	.33	.20	1.77
3.	.58	.33	.40	.42	.22	1.95
4.	.79	.41	.57	.55	.29	2.61

First leg enlarged and modified much as in male but to a lesser extent.

Spines. First leg: as in male except there are only two near distal end on femur and both tibial and metatarsal spines are long and fairly robust. Second leg: as in male except femur with only two dorsal and metatarsus ventral only 1r–0. Third leg: apparently only femur dorsal 0–0–0–1–1. Fourth leg: only femur dorsal distal 1 and tibial ventral 0–0–1p. Spines difficult to see in female.

Abdomen. Longer than wide in ratio of 15 : 11; more clearly pedunculate than in male; scutum much smaller and divided into a small anterior cap and a larger posterior part separated by the pseudoconstriction which is broader than in male; central part of venter covered with a fine thick fuzz and not chitinized as in male. Otherwise as in that sex.

Epigynum. Of moderate size; with only a slight posterior marginal notch; with two deep oval depressions nearly their long diameter from the posterior border, separated by a distinct septum which is nearly as wide as the short diameter of one of the depressions; a mass of coiled tubules lies between posterior margin and the depressions (Fig. 403).

Color in alcohol. Almost exactly as in male except for differences due to the restriction in the extent of the scutum and the presence of the ventral light grayish fuzz. Palp a light yellowish white except the grayish streaks on femur.

Type locality. Male holotype from Ft. Sherman, C. Z., Aug., 1939; female allotype from the Canal Zone Biological Area, July, 1936. One female paratype from Canal Zone Forest Reserve, C. Z., July, 1939.

Donatinus gen. nov.

Carapace moderately low, rather long and moderately narrow, gently arched from AME to PLE; undulant in profile behind PLE; widest in region of PLE; posterior steep declivity gradual and somewhat concave. *Eyes:* anterior row moderately recurved; PME considerably nearer to ALE than to PLE; PLE occupy nearly full width of carapace; posterior row slightly wider than anterior row; quadrangle of laterals considerably wider than long; total eye space occupies a little less than half the length of carapace. *Clypeus* moderately low. *Chelicerae* parallel, vertical, of moderate size; distinct fang groove with a single simple retromarginal tooth. *Maxillae* parallel, unmodified. *Sternum* rather long and narrow; widest in anterior third. *Legs:* 4132; fairly robust; with no fringes; first leg not enlarged; leg spines reduced in number and size. *Abdomen:* pedunculate, moderately

stout; slightly constricted near middle; spinnerets of moderate size. Whole body more or less ant-like. *Genotype: Donatinus niger* sp. nov.

Donatinus niger spec. nov.

Figures 404–406

Female holotype. Total length 7.04 mm. Carapace 3.26 mm. long, 1.66 mm. wide at level of PLE which occupy almost the full width of the carapace, 1.18 mm. tall and, therefore, .71 as tall as wide; cephalic part inclined forward and somewhat convex, thoracic part descends somewhat abruptly behind PLE, then is nearly level for some distance to the steep declivity which begins about half-way from PLE to posterior border (Figs. 404–405); lateral sides only slightly rounded from PME to opposite third coxae; viewed dorsally, the first steep descent behind PLE shows as a semicircular ridge, then there is a somewhat semicircular platform and then the second declivity; no indications of a median thoracic groove.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one fifteenth of the diameter of AME. Posterior row wider than anterior row in ratio of 25 : 22, wider than middle row in ratio of 5 : 4. Quadrangle of laterals wider than long in ratio of 10 : 7. Total eye space occupies seven sixteenths of length of carapace. Ratio of eyes AME : ALE : PME : PLE = 22.5 : 10.5 : 3.5 : 11. AME separated from one another by one twentieth of their diameter, almost contiguous to ALE. Middle eyes closer to ALE than to PLE in ratio of 13 : 8. Height of clypeus equal to nearly one fourth the diameter of AME. Clypeus decorated with a weak fringe of light colored convergent bristles, three or four long brown bristles beneath each AME, three long upturned brown bristles in lower angle between AME. A few white simple hairs beneath ALE and encircling AME.

Chelicerae. Parallel, vertical, of moderate size; basal segment .80 mm. long; front surface very rugulose; swollen near base medially to near middle of outer border. Fang moderately robust, evenly curved. Fang groove distinct; with three promarginal teeth close together on a ridge; a single rather small simple retromarginal tooth only about one third of the length of the groove from base to fang.

Maxillae. Parallel; longer than wide in ratio of 34 : 15; only moderately notched in middle of outer border; outer distal angle without tubercle or hook.

Lip. Slightly wider than long; basal excavations reach a little more than one third the length of the organ; reaches just beyond middle of maxillae. Sternal suture gently procurved.

Sternum. Longer than wide in ratio of 35 : 14; widest at interval between first and second coxae; anterior border with lateral lobes, narrower than base of lip in ratio of about 5 : 6; posterior end a slender sharp point not extended between fourth coxae which are separated by about one fifth of their width.

Legs. 4132. Tibial index of first leg 17, of fourth leg 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.35	.69	.96	.73	.70	4.43
2.	1.15	.67	.83	.70	.58	3.93
3.	1.28	.67	.85	.83	.51	4.14
4.	1.84	.94	1.33	1.26	.58	6.00

All legs robust, with a moderate supply of hair and no fringes. Palp: with tibia and tarsus somewhat enlarged and these segments with a reduced ventral and prolateral black fringe.

Spines. First leg: femur only prolateral distal 2; patella 0; tibia only ventral 0–0–1p (lacking on right); metatarsus only ventral 1p–1p, both merely cusps. Second leg: femur and patella as in first; tibia 0; metatarsus only ventral 1p–2, merely cusps. Third leg: femur prolateral and retrolateral distal 1; patella 0; tibia prolateral 0–1, ventral 0–1p–1p; metatarsus prolateral 0–2, retrolateral 1–2, ventral 1p–1p. Fourth leg: femur only prolateral distal 1; patella 0; tibia only ventral 0–1p–1p; metatarsus prolateral 0–1–1, retrolateral 0–1–2, ventral 0–2.

Abdomen. Pedunculate; ovoid, longer than wide in ratio of about 11 : 7, widest seven elevenths from base; slightly constricted about five elevenths from base; anal tubercle as usual; spinnerets short and inconspicuous; position of colulus indicated by a tuft of stiff black bristles; tracheal spiracle near base of spinnerets and with distinct lip but no tubercle; with four dorsal sigilla forming a quadrilateral figure widest behind.

Epigynum. Superficially resembles that of Z. formosa (Banks); plate fairly large with no posterior marginal notch, but with a swollen region where notch would occur; anterior half of plate with two very shallow depressions separated by a low septum and bounded by curved margins (Fig. 406).

Color in alcohol. Carapace: almost black; with white hairs distributed generally everywhere and with some iridescence. Palp

nearly black except light brown tarsus. Chelicerae dark brown; maxillae and lip the same with whitish tips. Sternum dark brown. Legs: generally dark brown; third coxae and trochanters dark brown, all others whitish with prolateral and retrolateral brown spots; all femora with narrow dorsal white stripes made by loose lanceolate hairs; first and second patellae, tibiae and metatarsi light dorsally; third patellae yellowish white in middle; fourth patellae yellowish white in middle; fourth tibiae the same at distal end. Abdomen: gray-brown with some iridescence and white hairs concentrated around and along lateral sides of constriction, making a poorly defined spot on each side; a large whitish spot just posterior to genital groove made by presence of loose white hair.

Type locality. Female holotype from Canal Zone Biological Area, Aug., 1936. No paratypes.

Genus Sebastira Simon, 1900

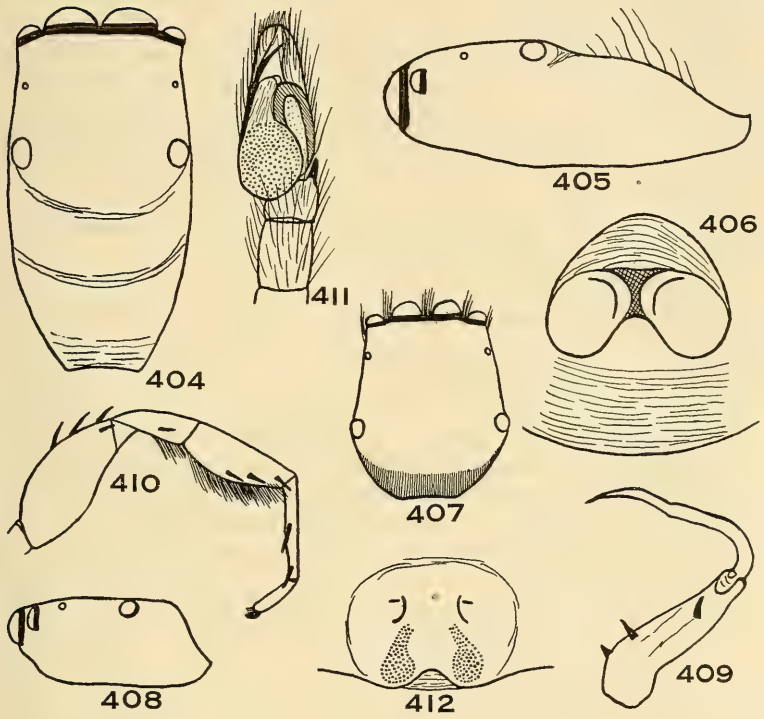
Sebastira plana spec. nov.

Figures 407–412

This species runs down to Sebastira in Simon's key, but it is impossible to tell whether it is the same as the one from Venezuela. In view of the uncertainty I have thought it better to describe it as new.

Male holotype. Total length 3.32 mm. Carapace 1.72 mm. long, 1.28 mm. wide at level of PLE which occupy the full width of the carapace and even project a little beyond the margin (Figs. 407–408); .76 mm. tall and, therefore, about .59 as tall as wide; almost flat dorsally from AME to steep posterior declivity which begins in middle half-way from PLE to posterior border; surface, especially dorsal area, granulate; with no indication of a thoracic groove; with a small amount of simple hair, a few bristles, and a moderate supply of white lanceolate hair to be noted later.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one twentieth of the diameter of AME. Posterior row wider than anterior row in ratio of nearly 5 : 4, wider than middle row in ratio of 4 : 3. Quadrangle of laterals wider than long in ratio of about 5 : 4. Total eye space occupies about seven tenths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 16 : 8 : 1.75 : 7.5. AME contiguous with one another and with ALE. Middle eyes closer to ALE than to PLE in ratio of 5 : 12. Height of clypeus equal to one eighth of the



External Anatomy of Spiders

Figs. 404–405. *Donatinus niger* Chickering; female carapace, dorsal and lateral views.
Fig. 406. *D. niger* Chickering; epigynum, ventral view.
Figs. 407–408. *Sebastira plana* Chickering; male carapace, dorsal and lateral views.
Fig. 409. *S. plana* Chickering; male chelicera.
Fig. 410. *S. plana* Chickering; first leg of male, prolateral view.
Fig. 411. *S. plana* Chickering; male palp, ventral view.
Fig. 412. *S. plana* Chickering; epigynum, ventral view.

diameter of AME. Clypeus decorated only with a ventral fringe of light brownish convergent bristles, three light brownish bristles beneath each AME, and three upturned light brownish bristles in lower angle between AME.

Chelicerae. Porrect, produced; divergent from near bases; basal segment .83 mm. long. Fang long, slender, sinuous, with irregularities along inner margin. Fang groove with two promarginal teeth near medial end; retromargin with a single, simple, fairly large, sharply pointed tooth about one third from base of fang (Fig. 409).

Maxillae. Slightly convergent; longer than wide in middle in ratio of 23 : 10; deeply and acutely notched in middle of outer border; outer distal corner mildly tuberculate.

Lip. Only slightly longer than wide; mildly notched in middle of distal border; quite convex from side to side on posterior surface; basal excavations reach only one third of length of organ; reaches only two fifths the length of the maxillae.

Sternum. Longer than wide in ratio of about 5 : 3, widest between second coxae; moderately convex especially between second and third coxae; anterior border somewhat narrower than base of lip; posterior end bluntly rounded and not extended between fourth coxae which are nearly contiguous. First coxae the stoutest and longest.

Legs. 1423. Tibial index of first leg 17, of fourth leg 12.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.15	.70	.82	.83	.45	3.95
2.	.70	.38	.48	.51	.32	2.39
3.	.70	.32	.38	.45	.32	2.17
4.	.92	.48	.62	.58	.32	2.92
Palp	.61	.26	.14	—	.50	1.51

First pair of legs with femora considerably flattened on prolateral surface and enlarged; patellae somewhat enlarged and with a small ventral fringe on distal half; tibiae somewhat enlarged, somewhat compressed laterally and with a well developed ventral fringe of black hairs (Figs. 410). Other legs without fringes but with a moderate supply of simple hair and white lanceolate hair.

Spines. First leg: femur dorsal 0–0–1–1–1, prolateral distal 1; patella only prolateral 0–1–0; tibia only ventral 2–2–2, occupying distal two thirds of segment; metatarsus only ventral 0–2–2. Second leg: femur and patella as in first; tibia only ventral 0–1r–2; metatarsus only ventral 0–1r–2. Third leg: femur dorsal 0–1–1–1, prolateral and

retrolateral distal 1; patella 0; tibia only prolateral 0–1; metatarsus only ventral 0–0–1p, retrolateral 0–1. Fourth leg: femur and patella as in third; tibia only ventral 0–1p–0–2; metatarsus only prolateral 0–0–1, ventral 0–0–1p. Palpal spines: only femur dorsal 0–0–1–1.

Palp. Femur considerably bent ventrally and twisted laterally; patella nearly twice as long as tibia but both short; tibial retrolateral apophysis a simple short stout spur; bulb quite strongly swollen, especially in basal half which is nearly globular; embolus arises on prolateral side of bulb and extends to near distal end of cymbium as a slender curved spine (Fig. 411).

Abdomen. To a certain extent pedunculate; broadly ovate, longer than wide in ratio of nearly 4 : 3; anal tubercle a short broad cone; spinnerets short, anterior pair stoutest, posterior pair slightly the longest, and middle pair slender and about as long as anterior pair; position of colulus indicated by a small tuft of stiff black hair; tracheal spiracle near base of spinnerets, with a distinct lip but no tubercle.

Color in alcohol. Carapace: reddish brown with eyes on black spots, darkest in interocular area, lightest behind PLE; numerous white lanceolate hairs all over surface, somewhat concentrated about eyes; with some iridescence, probably from granulate surface. Chelicerae reddish brown. Lip and maxillae deep amber, lighter at tips. Sternum brownish. Legs: first pair generally dark reddish brown, metatarsi yellowish white, femora with a dorsal streak of white lanceolate hair, patellae and tibiae with a distinct white stripe on promargin of dorsal surface and a much less distinct retromarginal white stripe; second pair with brown femora, yellowish patellae and tibiae, both with prolateral reddish brown stripe, metatarsi and tarsi yellowish white; third and fourth much like second but patellae and tibiae with much more reddish brown color; second, third, and fourth femora with much white dorsal lanceolate hair. Abdomen: a poorly defined brownish dorsal shield covers greater part of dorsum; lateral sides and venter brownish gray; with numerous clear, transparent, iridescent scales all over abdomen.

Female allotype. Total length 3.52 mm. Carapace 1.66 mm. long, 1.28 mm. wide at PLE, .64 mm. tall and, therefore, .50 as tall as wide; otherwise essentially as in male.

Eyes. Posterior row wider than anterior row in ratio of about 4 : 3, wider than middle row in ratio of 60 : 43. Quadrangle of laterals wider than long in ratio of about 4 : 3. Total eye space occupies almost two thirds of the length of the carapace. Height of clypeus equals one twelfth of the diameter of AME. Otherwise essentially as in male.

Chelicerae. Vertical, parallel; slightly excavated along middle of medial border; considerably swollen in front obliquely near base; with a small patch of white iridescent scales on apex of gibbosity; basal segment .36 mm. long. Fang of moderate size, evenly curved. Fang groove distinct; with two promarginal teeth and a single, simple, fairly robust tooth on retromargin.

Maxillae. Essentially as in male except they are less angulate.

Lip and *Sternum.* Essentially as in male.

Legs. 1423. Tibial index of first leg 21, of fourth leg 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	.83	.54	.54	.48	.29	2.68
2.	.64	.38	.38	.38	.26	2.04
3.	.58	.32	.38	.38	.28	1.94
4.	.77	.45	.57	.51	.29	2.59

First tibia much shorter and broader than in male, but otherwise essentially as in that sex.

Spines. First leg: apparently with no patellar spine; tibial and metatarsal spines robust and long; otherwise as in male. Second leg: femur as in male; patella 0; tibia only ventral 0–1r–1r; metatarsus only ventral 2–2. Third leg: femur dorsal 1–1–1, prolateral only distal 1; patella and tibia 0; metatarsus only prolateral 0–1, ventral 0–2, retrolateral 0–2. Fourth leg: femur dorsal 1–1–1, prolateral and retrolateral distal 1; patella and tibia 0; metatarsus only prolateral and retrolateral 0–1, ventral 0–1p. Palpal spines: femur dorsal 0–1–1.

Abdomen. Oval in outline; longer than wide in ratio of nearly 3 : 2. No indication of a dorsal shield as in male. Otherwise essentially as in male.

Epigynum. Simple, small; a fairly deep posterior marginal notch; to the right and left of the notch appears a fairly large spermatheca leading forward through a conspicuous tubule; somewhat in front of the middle of the plate are two slits somewhat oblique in position (Fig. 412).

Color in alcohol. Almost identical with that of male except on abdomen. This part of body gray-brown all over dorsum while venter is light brownish behind genital groove.

Type locality. Male holotype and female allotype from Canal Zone Biological Area, Aug., 1939. Many paratypes of both sexes from the following localities: Canal Zone Biological Area, June–July, 1934; June–Aug., 1936; June–Aug., 1939; Ft. Davis, C. Z., Aug., 1936; El

Valle, R. P., July, 1936; Arraijan, R. P., Aug., 1936; Madden Dam region, C. Z., Aug., 1936, 1939.

Genus ZUNIGA Peckham, 1892

Key to the species of Zuniga from Panama

Males

1. Total eye space occupies about three sevenths of length of carapace. Palp: embolus completely encircles bulb and makes a second loop near middle of cymbium ..... *Z. formosa*, (p. 447)
1. Total eye space occupies half the length of the carapace. Palp: embolus arises on prolateral side of bulb at base, passes forward and across to retrolateral side but lacks any terminal loop ..... *Z. furva*, (p. 449)

ZUNIGA FORMOSA (Banks), 1929

Figures 413–415

Sarinda formosa Banks, 1929

Female allotype. Total length 9.28 mm. Carapace 4.35 mm. long, 1.79 mm. wide about half-way from PLE to posterior border where carapace is as wide as at anterior row of eyes; PLE occupy just slightly less than full ventral width at their level; 1.26 mm. tall and, therefore, .70 as tall as wide; cephalic part inclined forward and somewhat convex; PLE on prominent tubercles; descent abrupt behind PLE, then continues with little change to steep posterior declivity which begins nearly three fourths of distance from PLE to posterior border; thoracic part low laterally and raised into a dorsal ridge centrally; surface finely granulate; with only scattered white hairs with some concentration along groove posterior to PLE and along mid-dorsal ridge; with no indication of a median thoracic groove.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one fifteenth of the diameter of AME. Anterior row wider than posterior in ratio of 27 : 25, wider than middle row in ratio of 27 : 22. Quadrangle of laterals wider than long in ratio of 6 : 5. Total eye space occupies thirty sixty-sevenths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 28 : 15 : 3.5 : 15. AME contiguous to one another and to ALE. Middle eyes closer to ALE than to PLE in ratio of 3 : 4. Height of clypeus equal to three sevenths of the diameter of AME. Clypeus decorated with a weakly developed coat of white hairs and the following bristles: two black convergent bristles just beneath AME, one black convergent bristle near ventral margin beneath AME,

and three long upturned brown bristles in lower angle between AME.

Chelicerae. Parallel, vertical; of moderate size; basal segment .96 mm. long. Fang moderately robust, evenly curved. Fang groove distinct; with four promarginal teeth; and a single, simple, fairly robust retromarginal tooth.

Maxillae. Parallel; longer than wide in middle in ratio of 7 : 3; only slightly notched in middle of outer border; outer border and outer distal corner strongly chitinized but without tubercle or hook; surface slightly excavated contiguous to outer distal corner.

Lip. Longer than wide in ratio of 25 : 22; basal excavations reach three fifths of the length of the organ; reaches just beyond middle of maxillae. Sternal suture straight.

Sternum. Long and tapering: longer than wide in ratio of 30 : 11, widest at interval between first and second coxae; anterior border three quarters as wide as base of lip; moderately convex, with secondary convexities opposite first and second coxae; posterior end divided but not extended between fourth coxae which are separated by about one sixth of their diameter (Fig. 414). Fourth trochanter twice as long as any other.

Legs. 4132. Tibial index of first leg 8, of fourth leg 10.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	2.05	1.00	2.36	1.47	.64	7.52
2.	1.66	.88	1.40	1.09	.57	5.60
3.	1.98	.90	1.47	1.40	.65	6.40
4.	3.07	1.02	2.62	2.18	.70	9.59

All legs slender, with little hair and no fringes. Palps with patellae, tibiae, and tarsi enlarged, rounded, not flattened; with a dense black prolateral fringe along these segments and on dorsal side of femora composed of lanceolate hair.

Spines. First leg: femur and patella 0; tibia only ventral 2–2–2; metatarsus only ventral 2–2–2. Second leg: femur only dorsal distal 1; patella 0; tibia prolateral 0–1–1, ventral 2–2–2, not well matched; metatarsus only ventral 2–2–2. Third leg: femur only prolateral distal 2; patella 0; tibia prolateral 0–1–1, retrolateral 1–1–1, ventral 2–1p–2; metatarsus prolateral and retrolateral 1–1–2, ventral 0–2–2. Fourth leg: femur only prolateral and retrolateral distal 1; patella 0; tibia only retrolateral 0–0–1, ventral 2–1p–2 on left and 1p–1p–2 on right; metatarsus prolateral 0–1–2, retrolateral 1–1–2, ventral 2–2.

Abdomen. Pedunculate; longer than wide in ratio of 75 : 33; with a slight constriction about three sevenths from base; widest just behind

constriction; anal tubercle as usual in the genus; spinnerets crowded, with anterior pair short and stout, posterior pair slender and longest; position of colulus indicated by a prominent tuft of black hairs; region between base of spinnerets and lip of tracheal spiracle with many black bristles.

Epigynum. Of moderate size, much swollen; posterior marginal notch fairly deep and very broad; main part consists of a smooth, yellowish white area bounded by curved lines (Fig. 415).

Color in alcohol. Carapace: reddish brown, eyes on black spots; white hairs generally distributed but they appear to be concentrated on dorsal ridge from constriction to near posterior border and in the constriction itself. Palps reddish brown with black fringe. Sternum and chelicerae reddish brown. Lip and maxillae reddish brown with whitish tips. Legs: first pair of coxae yellowish white, second the same with brown retrolateral spot, third and fourth brown; all trochanters yellowish white with brown spots; otherwise legs in general are reddish brown, first and second femora and patellae yellowish white above, femora also the same below. Abdomen: grayish brown in general; at constriction there is a nearly black dorsal recurved bar, further back a series of light and dark recurved bars; laterally gray-brown with a white spot about two fifths from base and a very small white spot further back; venter yellowish white just behind genital groove; elsewhere brown with rows of yellowish dots.

Type locality. Female allotype from Canal Zone Biological Area, July, 1939; female paratypes from the same locality, Aug., 1936 and June–July, 1939. Numerous males also from the same locality, June–Aug., 1936 and June–Aug., 1939. Other males from El Valle, R. P., July, 1936; Canal Zone Forest Reserve, C. Z., July–Aug., 1939.

Zuniga furva spec. nov.

Figures 416–418

Male holotype. Total length 4.60 mm. Carapace 2.49 mm. long, 1.34 mm. wide just in front of PLE which do not occupy quite the full width of the carapace, 1.04 mm. tall and, therefore, about .78 as tall as wide; surface finely granulate; with no indication of a definite median thoracic groove; with two long dorsal bristles about half-way from PLE to posterior border.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one tenth of the diameter

of ALE. Anterior row wider than posterior row in ratio of 15 : 14, wider than middle row in ratio of 5 : 4. Quadrangle of laterals wider than long in ratio of 60 : 43. Total eye space occupies half the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 21 : 10.5 : 2.5 : 10.5. AME contiguous to one another and to ALE. Middle eyes equidistant from ALE and PLE or, perhaps, a little closer to ALE. Height of clypeus equal to one third of the diameter of AME. Clypeus decorated only with a weak fringe of white hairs and bristles, two or three light brown bristles beneath each AME, and three long upturned bristles in lower angle between AME. AME surrounded by a ring of white hairs.

Chelicerae. Porrect, strongly divergent from bases; basal segment 1.10 mm. long; front surface covered by numerous white lanceolate hairs each of which has a slender base. Fang long, slender, sinuous, attenuated distally. Fang groove with four teeth on promargin, three of which are mounted on a common low tubercle; with a single retromarginal tooth, large, robust, and turned toward base of fang (Fig. 416).

Maxillae. Slightly convergent; longer than wide in middle in ratio of about 2 : 1; slightly but acutely notched in middle of outer border; palp inserted into basal two fifths; outer distal corner rounded; anterior margin from notch to corner bladelike and strongly chitinized; posterior surface striated contiguous to notch.

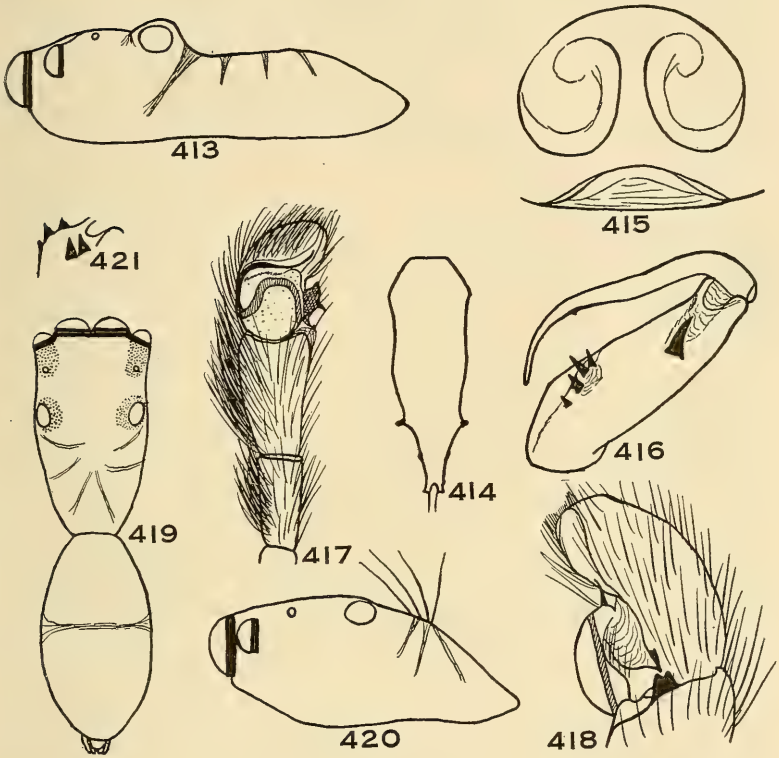
Lip. Longer than wide in ratio of 5 : 4; basal excavations reach almost half the length of the organ; reaches just beyond middle of maxillae. Sternal suture gently procurved.

Sternum. Longer than wide in ratio of 23 : 13; widest between second coxae; tapered to a blunt posterior point not extended between fourth coxae which are separated by nearly one fifth of their width; anterior border almost as wide as base of lip; moderately convex, especially between second and third coxae.

Legs. 4132. Tibial index of first leg 7, of fourth leg 9.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.60	.58	1.85	1.22	.64	5.89
2.	1.18	.51	1.09	.90	.44	4.12
3.	1.34	.51	1.09	1.15	.39	4.48
4.	1.92	.57	1.60	1.53	.52	6.14
Palp	.80	.58	.75	—	.64	2.77

All legs slender and with little hair; with no fringes.



External Anatomy of Spiders

Fig. 413. *Zuniga formosa*, female carapace, lateral view.
Fig. 414. *Z. formosa*, sternum.
Fig. 415. *Z. formosa*, epigynum, ventral view.
Fig. 416. *Z. furva* Chickering; male chelicera.
Figs. 417–418. *Z. furva* Chickering; male palp, ventral view; palpal tibia and tarsus, retrolateral view.
Figs. 419–420. *Parafluda banksi* Chickering; male, dorsal view; carapace, lateral view.
Fig. 421. *P. banksi* Chickering; male cheliceral teeth.

Spines. First leg: femur only prolateral distal 2; patella 0; tibia only ventral 2–2–2; metatarsus prolateral and retrolateral 0–1, ventral 0–2–0. Second leg: femur and patella as in first; tibia only ventral 2–1r–2; metatarsus as in first except ventral 0–2–2(weak). Third leg: femur and patella as in first; tibia only ventral 0–0–2 on right side, 0 on left; metatarsus prolateral and retrolateral 0–2, ventral 0–2–2(weak). Fourth leg: femur only prolateral distal 2, retrolateral distal 1; patella 0; tibia only ventral 0–0–1r; metatarsus prolateral and retrolateral 1–2, ventral 0–0–2(weak).

Palp. Femur slightly bent; patella about two thirds as long as tibia; tibia considerably swollen, club-shaped; tibial retrolateral apophyses, two short distal processes; bulb considerably swollen; embolus arises at base of bulb on prolateral side, curves forward to distal end; bulb with a long recurved tubular loop; cymbium modified on retrolateral side into three processes, apparently associated with the short tibial apophyses (Figs. 417–418).

Abdomen. Ovoid, longer than wide in ratio of 34 : 21, widest near middle; spinnerets and anal tubercle as usual in the genus; position of colulus barely indicated; tracheal spiracle near base of spinnerets, without tubercle but with a fairly distinct lip.

Color in alcohol. Carapace: brown with eyes on black spots; with short white hairs scattered over surface but not concentrated anywhere except about the anterior row of eyes where they are longest and most conspicuous. Palps brown with deep black fringe. Chelicerae deep amber, darker in front. Maxillae and lip amber with whitish tips. Sternum amber, dusted with brown and bordered with black. Legs: first pair with coxae yellowish white, tarsi and metatarsi brownish, other segments yellowish white dorsally and ventrally and brownish elsewhere; second pair like the first but tarsi lighter; third pair with coxae brown except yellowish white ventrally, trochanters yellowish white ventrally and dorsally, elsewhere brown, other segments mostly brown, lighter above except yellowish white tarsi; fourth pair like third except coxae and trochanters yellowish white above. Abdomen: generally gray-brown with a faintly indicated broad light median dorsal bar and several faintly indicated narrow bars in posterior half.

Type locality. Male holotype from Canal Zone Biological Area, Aug., 1936; three male paratypes from the same locality, July–Aug., 1936.

Sarinda Group

Key to the genera in the Sarinda Group

1. Body extremely attenuated, fully five or six times as long as broad; both carapace and abdomen with a deep constriction near middle. Fourth coxae and trochanters long and strongly developed.... *Simonella*, (p. 468)
1. Not with combination of characters given above.....2
2. Carapace: with a moderate constriction a short distance behind PLE; about twice as long as broad; with lateral sides nearly parallel; gently arched from AME to thoracic constriction; total eye space occupies slightly less than half the length of the carapace; PME equidistant from ALE and PLE. Abdomen without a constriction; with a well developed dorsal shield in both sexes..... *Erica*, (p. 454)
2. Not with combination of characters given above.....3
3. Carapace: without a definite constriction; moderately high, about twice as long as broad; lateral sides nearly parallel in cephalic part. Abdomen often with a well defined constriction. First leg with femur enlarged, especially in male; first tibia with five or six pairs of ventral spines; first metatarsus with three pairs of ventral spines..... *Fluda*, (p. 454)
3. Not with combination of characters given above.....4
4. Carapace: with a moderate constriction behind PLE; interocular region nearly flat, thoracic region convex; total eye space occupies about half the length of the carapace. Male chelicerae variable, but usually as long as carapace or longer. Abdomen often with a mild constriction about two fifths from base..... *Myrmarachne*, (p. 455)
4. Not with combination of characters given above.....5
5. Carapace: rather tall; lateral sides of cephalic region vertical and parallel; thoracic part convex; with no definite constriction; less than twice as long as broad; PME closer to ALE than to PLE. Chelicerae vertical and parallel, without special modifications. First leg without enlargement in any segment; first tibia with five pairs of ventral spines; first metatarsus with two pairs of ventral spines..... *Parafluda*, (p. 456)
5. Not with combination of characters given above.....6
6. Carapace: moderately tall; convex dorsally; dilated somewhat in region of PLE; PME closer to ALE than to PLE; with no definite constricton; about four fifths as broad as long; total eye space occupies slightly more than half of the length of the carapace. Chelicerae with a single, fairly. robust retromarginal tooth; porrect, produced, flattened dorsally in males Abdomen with a mild constriction, more evident in males ..... *Paradamoetas*, (p. 459)

6. Carapace: moderately tall in cephalic part, low in thoracic part with a considerable drop behind PLE; nearly flat in interocular area, very convex in thoracic region; somewhat more than twice as long as broad; PME about equidistant from ALE and PLE. First tibia with three or four pairs of ventral spines; first metatarsus with two pairs of ventral spines..... *Sarinda*, (p. 459)

Genus Erica Peckham, 1892

The genus is at present represented by only one species. I have a male and a female from El Valle, R. P., July, 1936, which I expect to describe as a new species but time has not yet permitted me to do this.

Erica eugenia Peckham, 1892

E. Eugenia F. Cambridge, 1900
E. eugenia Simon, 1901
E. eugenia Petrunkevitch, 1911
E. eugenia Pětrunkevitch, 1925

The Peckhams originally had this species from Brazil and Peru, but F. Cambridge states that Mr. Peckham identified a male from Bugaba, Panama, as belonging to it. It has not yet appeared in my collection:

Genus Fluda Peckham, 1892

Fluda princeps Banks, 1929

The genus Fluda seems to be distinctly South American. This is the only species known in Central America. In his original description Mr. Banks pointed out that Keyserlingella and Fluda should be combined. If that were done Fluda would stand as the genus on account of page priority. Mr. Banks also stated that this species might have been considered a form of *K. perdita* Peckham, but because his males seemed to be different from the one from which Mr. Emerton made a drawing of the palpus he thought it best to consider it as new to science. Unfortunately, the male of *K. perdita* is not now in the collection in the Museum of Comparative Zoölogy. I have studied the female and consider it identical to those included in this species from the Canal Zone. I am uncertain about the males and, in view of this fact, I have chosen to treat the species as *F. princeps* although it may have to be considered as *K. perdita* when we have more

conclusive evidence. I have numerous specimens of both sexes from: Canal Zone Biological Area, July, 1934; El Valle, R. P., July, 1936; Porto Bello, R. P., Aug., 1936; Canal Zone Forest Reserve, C. Z., Aug., 1939.

Genus Myrmarachne MacLeay, 1839

The two species of Myrmarachne now known to occur in Panama may be separated by the following key:

Key to the species of Myrmarachne from Panama

Males

1. Palp: longer than carapace; tibia about twice as long as tarsus. Cheliceral teeth all at medial end of groove. First tarsus dark brown..... *M. championi*, (p. 456)
1. Palp: not more than two thirds as long as carapace; tibia somewhat shorter than tarsus. Cheliceral teeth at both ends of fang groove. First tarsus mostly yellowish white..... *M. centralis*, (p. 455)

Females

1. First tibia with seven pairs of ventral spines. Epigynum with a pair of white circular areas separated by a low septum..... *M. centralis*, (p. 455)
1. First tibia with four pairs of ventral spines. Epigynum with a broad central region bounded by curved lines; with no circular white areas..... *M. championi*, (p. 456)

Myrmarachne centralis (Peckham), 1892

Salticus centralis Peckham, 1892
Toxeus centralis F. Cambridge, 1900
M. centralis Simon, 1901
M. centralis Petrunkevitch, 1911
M. centralis Petrunkevitch, 1925
M. centralis Banks, 1929

The Peckhams reported this species simply from Central America in the original description, but the vial in which these are kept in the collection in the Museum of Comparative Zoölogy is labelled from Guatemala. There is a high degree of variation in this species in regard to spination and degree of development of the chelicerae, especially in the males. I have in my collection three males and ten females all from the Canal Zone Biological Area, June–July, 1934; July, 1936; June–Aug., 1939.

Myrmarachne championi (F. Cambridge), 1900

Toxeus championi F. Cambridge, 1900
M. championi Simon, 1901
M. championi Petrunkevitch, 1911
M. championi Petrunkevitch, 1925

There are three males and five females in my collection from the following localities: Canal Zone Biological Area, July, 1934; Porto Bello, R. P., Aug., 1936; Canal Zone Forest Reserve, C. Z., Aug., 1939.

Parafluda gen. nov.

Carapace moderately high, gently arched from AME to posterior border of PLE, then a moderate decline with little difference between this region and steep posterior declivity which begins just before the middle point between PLE and posterior border; moderately long; widest in region of PLE; with no indication of a median thoracic groove. *Eyes:* anterior row moderately recurved; PME somewhat closer to ALE than to PLE; PLE project a little beyond dorsal margin of carapace, but occupy slightly less than full width at ventral margin; anterior row slightly wider than posterior row; quadrangle of laterals only a little wider than long; total eye space occupies one half the length of the carapace. *Clypeus* moderately low. *Chelicerae:* vertical, parallel, of moderate size; distinct fang groove with two teeth of moderate size along retromargin. *Maxillae* slightly convergent, unmodified. *Sternum* cardiform; broad at anterior end. Legs: 1423; fairly long and slender; first leg without fringe and without enlarged segments; leg spines definitely reduced in number; first pair of tibiae with five pairs of ventral spines not well matched. *Abdomen:* ovoid; slightly constricted near middle. *Genotype: Parafluda banksi* sp. nov.

Parafluda banksi spec. nov.

Figures 419–424

It was formerly thought that this species could be described as a Fluda, but now after more thorough study the differences appear to be too great and so I am compelled to erect a new genus for it.

Male holotype. Total length 3.65 mm. Carapace 1.89 mm. long, 1.00 mm. wide at PLE which project a little beyond dorsal margin but occupy slightly less than full width of ventral margin; .77 mm. tall

and, therefore, .77 as tall as wide; lateral sides of cephalic part nearly vertical and parallel; thoracic part generally very convex; interocular region moderately inclined from AME to PLE, then there is a slight drop from which the descent is gradual to beginning of steep posterior declivity which occurs nearly three sevenths of the distance from PLE to posterior border; with no evidence of a distinct thoracic groove but there are three pairs of striations along lateral sides of thoracic part (Figs. 419–420).

Eyes. Seen from in front, anterior row recurved so that dorsal borders of ALE are slightly below those of AME. Anterior row wider than posterior row in ratio of 46 : 43, wider than middle row in ratio of 23 : 19. Quadrangle of laterals wider than long in ratio of 23 : 19. Total eye space occupies one half the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 16 : 9 : 3 : 9. AME barely separated from one another and from ALE. Middle eyes closer to ALE than to PLE in ratio of about 3 : 4. Height of clypeus equal to nine thirty-seconds of the diameter of AME. Clypeus decorated only with two or three whitish bristles beneath each AME, three bristles in lower angle between AME, the upper one long and brown, the two lower shorter and whitish, and also a few slender white hairs around margin of AME.

Chelicerae. Vertical, parallel, almost rectangular in outline, viewed from in front; basal segment .51 mm. long; without special modifications. Fang moderately slender, evenly curved. Fang groove distinct; promargin with three teeth, all near medial end of groove; retromargin with two teeth of moderate size, set close together near the middle (Fig. 421).

Maxillae. Slightly convergent, longer than wide in middle in ratio of 19 : 12; palp inserted into basal third; outer border only slightly concave in middle; distal border rounded and continuous with outer lateral boundary with no distal angle between; well developed scopula along truncature.

Lip. Wider than long in ratio of 13 : 10; basal excavations reach slightly less than one third of the length of the organ; reaches to middle of maxillae. Sternal suture procurved.

Sternum. Somewhat cardiform; longer than wide in ratio of 39 : 25, widest at interval between first and second coxae; a low tubercle opposite each first coxa and a hardly distinguishable convexity opposite each second coxa; first coxae separated by twenty-three twenty-fifths of the greatest width of the sternum; anterior border as wide as base of lip; posterior end a sharp point not extended between fourth coxae

which are separated by about one sixth of their width. Anterior coxae somewhat the longest but not much enlarged.

Legs. 1423. Tibial index of first leg 8, of fourth leg 10.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.28	.58	1.34	.88	.51	4.59
2.	.82	.45	.69	.58	.34	2.88
3.	.77	.38	.64	.68	.35	2.82
4.	1.22	.51	1.15	.97	.50	4.35
Palp	.56	.22	.16	—	.58	1.52

All legs with a moderate supply of hair, but without fringes or tufts. First leg not enlarged in any segment as it is in Fluda.

Spines. First leg: femur and patella 0; tibia only ventral 2–2–2–2–2, not well matched; metatarsus only ventral 2–2 (Fig. 422). Second leg: as in first except tibia prolateral 0–0–1, ventral 2–2–2 and metatarsus prolateral 1–1. Third leg: femur and patella 0; tibia only ventral 0–1p–0–2; metatarsus prolateral 1–1, retrolateral 0–1, ventral 2–2. Fourth leg: prolateral 0–1, retrolateral 0–1, ventral 2–2; elsewhere 0. Palpal spines: apparently only one at distal end of cymbium.

Palp. Femur straight; both patella and tibia short, with latter eight elevenths as long as former; retrolateral tibial apophysis a short spur; bulb swollen very strongly; embolus arises near distal border, describes considerably more than a complete circle, then passes to retrolateral side of cymbium where it makes a graceful loop to terminate near distal end of cymbium (Figs. 423–424.).

Abdomen. 1.86 mm. long; longer than wide in ratio of 29 : 16; widest about the middle; with a slight constriction just before the middle which is more evident dorsally than elsewhere; a lanceolate, strongly chitinized region from base to constriction suggests a scutum; anal tubercle a short broad yellowish cone; six spinnerets of moderate size and length without special features, anterior pair approximated at bases and the stoutest, posterior pair far apart and about as long and slender as middle pair; position of colulus uncertain; tracheal spiracle near base of spinnerets, with obscure lip but no tubercle.

Color in alcohol. Carapace: generally yellowish brown; interocular area yellowish; eyes on black spots; a very narrow and somewhat incomplete ventral marginal dark brown line. Palps dark brown. Chelicerae light reddish brown. Maxillae and lip light reddish brown with brown streaks and whitish tips. Sternum yellowish with faint brown areas in posterior two thirds. Legs: first pair yellowish with a pro-

lateral and a retrolateral brown stripe which is broad on femora but narrow on other segments to metatarsi which are entirely brown everywhere except in basal quarter which together with tarsi are yellowish white with brown on lateral sides at bases; second and third pairs yellowish with a few inconspicuous brownish spots; fourth pair yellowish with prolateral and retrolateral stripes on femur, tibia, and with brown stripes on both lateral sides coming together dorsally at base, metatarsus brown everywhere except ventrally and dorsally for a short distance both at base and distally. Abdomen: dorsally light brownish in basal two fifths back to constriction; a yellowish white band across at the constriction; then dorsally light brown with some iridescence to spinnerets; in center of dorsum a series of four narrow, yellowish white, recurved bars bounded in front by a similar series of recurved brown bars; across the middle of each lateral side the white dorsal bar passes obliquely; in front of this oblique bar the area is very light brown and behind it dark brown; venter generally light brownish.

Type locality. Male holotype from El Valle, R. P., July, 1936. No paratypes.

Genus Paradamoetas Peckham, 1885

Paradamoetas formicina Peckham, 1885

P. formicina Peckham, 1892
P. formicina F. Cambridge, 1900
P. formicina Simon, 1901
P. formicina Peckham, 1909
P. formicina Petrunkevitch, 1911
P. formicina Petrunkevitch, 1925

The proper placement of this species is in considerable doubt. Peckham placed it among the ant-like forms and F. Cambridge continued this by putting it in his Synageleae. Simon and Petrunkevitch ('28) have put it in the system close to Metaphidippus. The Panama record is based upon a single female from Bugaba identified by F. Cambridge. The species has not yet appeared in my collection.

Genus Sarinda Peckham, 1892

The genus Sarinda has not been known in Panama before this time. Mr. Banks ('29) described a species as *Sarinda formosa* but I have been compelled to transfer it to the genus Zuniga as already pointed out. Females belonging to three species have appeared in my collection

but males are completely lacking. The females may be separated by the following key:

Key to the species of Sarinda from Panama

Females

1. Carapace with a narrow white band following the constriction behind PLE. Epigynum: small; with a fairly broad and deep posterior marginal notch; with a small depressed area just anterior to notch; near anterior margin of plate are two, small, nearly contiguous, circular spermathecae . . . . . *S. stricta*, (p. 466)

1. Not with combination of characters given above 2

2. Epigynum: large and conspicuous; wider than long; posterior margin with a heavy chitinous lip but no definite notch; posterior half of plate occupied by a pair of large depressions separated by a septum . . *S. bicavata*, (p. 460)

2. Epigynum: small and inconspicuous; considerably swollen in front of genital groove; with a smooth white area in anterior half surrounded by procurved margins which unite centrally to form an incomplete septum . . . . . *S. silvatica*, (p. 463)

SARINDA BICAVATA spec. nov.

Figures 425–427

Female holotype. Total length 5.00 mm. Carapace 2.26 mm. long, 1.20 mm. wide at level of PLE which occupy slightly more than the full width of the carapace at their level, .86 mm. tall and, therefore, .71 as tall as wide, tallest at level of PLE; with a moderate constriction immediately behind these eyes, then a gradual descent to steep posterior declivity which begins almost seven tenths of the distance from PLE to posterior border; with no definite visible longitudinal median thoracic groove.

Eyes. Seen from in front, anterior row recurved so that dorsal borders of ALE are slightly above those of AME. Anterior row slightly wider than posterior row, wider than middle row in ratio of 39 : 31. Quadrangle of laterals wider than long in ratio of 39 : 29. Total eye space occupies half the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 20 : 10.5 : 2 : 11. AME almost contiguous with one another and with ALE. Middle eyes equidistant from ALE and PLE. Height of clypeus equal to three tenths of the diameter of AME. Clypeus decorated only with a scant fringe of elongated white lanceolate hairs, three brown bristles beneath each AME, and three long brown upturned bristles in lower angle between AME.

Chelicerae. Parallel, vertical; considerably swollen in front obliquely from near base to outer distal corner; basal segment .58 mm. long. Fang slender, evenly curved except for a chitinous ridge about two fifths from base, with a small tubercle on inner margin at ridge, perhaps representing a suppressed tooth. Fang groove distinct; with five slender promarginal teeth fairly well spaced apart; with five slender retromarginal teeth so close together that their bases are practically united (Fig. 425).

Maxillae. Longer than wide in middle in ratio of 23 : 12; only slightly notched in middle of outer border; palp inserted into basal two fifths; outer distal corner rounded so that angle is lacking.

Lip. As wide as long; basal excavations reach almost to middle of organ; reaches slightly beyond middle of maxillae. Sternal suture gently procurved.

Sternum. Longer than wide in ratio of 45 : 24; widest between first coxae; narrowed to posterior end which is bluntly rounded and not extended between fourth coxae which are separated by one seventh of their width; moderately convex especially between second and third coxae (Fig. 426). Anterior coxae the slenderest, second nearly globose.

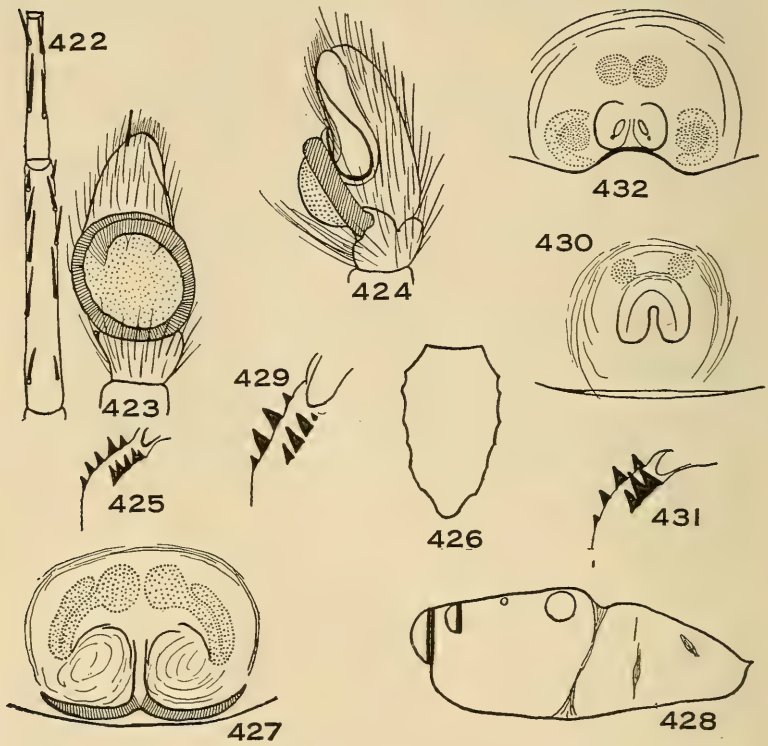
Legs. 4132. Tibial index of first leg 8, of fourth leg 9.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.28	.41	1.28	.83	.51	4.31
2.	1.02	.41	.80	.70	.38	3.31
3.	1.09	.46	.83	.70	.45	3.53
4.	1.66	.52	1.34	1.34	.45	5.31

All legs slender, with a small quantity of hair and few spines. With no fringes on legs. Palp with tarsus and tibia enlarged but not noticeably flattened; both segments with a heavy prolateral fringe of robust black lanceolate hairs.

Spines. First leg: femur and patella 0; tibia only ventral 2–2–2; metatarsus only ventral 2–2. Second leg: as in first. Third leg: femur, patella, and tibia 0; metatarsus prolateral 0–2, retrolateral 0–1, ventral 0–2–2. Fourth leg: as in third except metatarsus prolateral 0–1, ventral 0–1r–0. Palpal spines 0.

Abdomen. Pedunculate; ovoid, longer than wide in ratio of 40 : 27, widest in middle; with no definite constriction; anal tubercle a short broad flattened cone; posterior spinnerets spread wide apart so that middle pair is clearly exposed to view, otherwise unnoteworthy; position of colulus indicated by a tuft of stiff hairs; tracheal spiracle



External Anatomy of Spiders

Fig. 422. *Parafluda banksi* Chickering; tibia and metatarsus of first leg, ventral view.

Figs. 423–424. *P. banksi* Chickering; tibia and tarsus of male palp, ventral and retrolateral views.

Fig. 425. *Sarinda bicavata* Chickering; female cheliceral teeth.

Fig. 426. *S. bicavata* Chickering; sternum.

Fig. 427. *S. bicavata* Chickering; epigynum, ventral view.

Fig. 428. *S. silvatica* Chickering; carapace, lateral view.

Fig. 429. *S. silvatica* Chickering; cheliceral teeth.

Fig. 430. *S. silvatica* Chickering; epigynum, ventral view.

Fig. 431. *S. stricta* Chickering; cheliceral teeth.

Fig. 432. *S. stricta* Chickering; epigynum, ventral view.

near base of spinnerets, with a strongly chitinized lip but with no tubercle.

Epigynum. Large and conspicuous; posterior margin with a chitinous lip but no notch; two procurved margins form the posterior borders of two depressions separated by a septum; anterior half of plate somewhat swollen and with spermathecae and associated tubules showing clearly through the chitin (Fig. 427).

Color in alcohol. Carapace: dark brown overlaid with a few white lanceolate hairs, more conspicuous in vicinity of anterior eyes; eyes on black spots; interocular area almost black. Legs: third coxae dark brown dorsally, all others whitish; first tarsi brown, all others yellowish white; first and second femora, patellae, tibiae, and metatarsi yellowish white with lateral brown stripes; third and fourth femora all dark brown, other segments between femora and tarsi brown, lighter above and below. Chelicerae reddish brown. Maxillae and lip amber with white tips and brown streaks. Palps: patellae, tibiae and tarsi reddish brown with much black hair. Abdomen: dark gray with the following yellowish white marks: a fairly broad girdle between first and second thirds continues ventrally just behind genital groove; a narrow recurved and somewhat wavy bar; a short but fairly broad bar, and lastly another narrow bar near posterior end; spinnerets yellowish white. Clarity of abdominal markings differs considerably among paratypes.

Type locality. Female holotype and three female paratypes from he Canal Zone Biological Area, July, 1936.

Sarinda silvatica spec. nov.

Figures 428–430

Female holotype. Total length 6.72 mm. Carapace 3.14 mm. long, 1.54 mm. wide at some distance behind PLE which project somewhat beyond the sides of the carapace at their level but which are slightly narrower than width of ventral margin, 1.09 mm. tall and, therefore, about .71 as tall as wide; cephalic part inclined somewhat as in Zuniga; tallest at level of PLE, with an abrupt fall a short distance behind these eyes and a constriction at bottom of descent, then after a short distance a gradual descent to posterior border (Fig. 428); no median longitudinal thoracic groove observed, but a series of six striae radiate from central dorsal region of constriction; surface finely granulate in cephalic area, coarsely granulate in thoracic region.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of AME cuts off about one sixth of the diameter of ALE. Anterior row as wide as posterior row, both wider than middle row in ratio of 11 : 9. Quadrangle of laterals wider than long in ratio of 44 : 35. Total eye space occupies eight nineteenths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 22 : 11.5 : 2.5 : 12. AME nearly contiguous to one another and to ALE. Middle eyes slightly closer to PLE than to ALE. Height of clypeus equal to nearly two fifths of the diameter of AME. Clypeus decorated only with a weak ventral fringe of whitish bristles, a few scattered white hairs, two long brown bristles beneath AME, one close and one remote, and three long brown upturned bristles in lower angle between AME.

Chelicerae. Vertical, parallel; of moderate size; basal segment .78 mm. long. Fang of moderate size, evenly curved. Fang groove distinct; with four promarginal teeth, two middle ones fairly robust, first and last small; also four retromarginal teeth, three of moderate size and nearly equal, the last one minute (Fig. 429).

Maxillae. Longer than wide in middle in ratio of about 15 : 9; only slightly notched in middle of outer border; outer distal corner smoothly rounded, with no tubercle and no hook.

Lip. Slightly longer than wide; basal excavations reach about two fifths of its length; reaches to middle of maxillae. Sternal suture straight.

Sternum. Longer than wide in ratio of 63 : 32, widest between first coxae; with same general form as in *S. bicavata* sp. nov., but borders much less definite than in that species; here borders seem to be united to sclerites which extend between coxae; anterior border about as wide as base of lip; posterior end a blunt point not extended between fourth coxae which are nearly contiguous.

Legs. 4132. Tibial index of first leg 7, of fourth leg 10.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.79	.77	1.86	1.15	.65	6.22
2.	1.28	.69	1.15	.96	.58	4.66
3.	1.41	.70	1.28	1.22	.58	5.19
4.	2.54	.83	2.01	1.79	.64	7.81

All legs slender, with little hair and no fringes. Palp with last three segments enlarged, especially the tarsus and tibia, not noticeably flat-

tened, with a heavy black iridescent prolateral fringe along the enlarged segments and also on the dorsal surface of the femur.

Spines. All femora and patellae devoid of spines. First leg: tibia only ventral 2–2–2–2; metatarsus only ventral 2–2. Second leg: tibia only ventral 2–2–2; metatarsus prolateral 1–2, retrolateral 1–1, ventral 0–2(weak). Third leg: tibia prolateral 0–0–1, ventral 1p–0–2; metatarsus prolateral and retrolateral 1–2, ventral 2–2. Fourth leg: tibia only ventral 1p–1p–2; metatarsus prolateral and retrolateral 0–2, ventral 2–2(weak). No palpal spines observed.

Abdomen. Pedunculate; nearly cylindrical; longer than wide in ratio of 55 : 22; with a mild constriction four elevenths of its length from base; widest seven elevenths from base; anal tubercle a rather prominent segmented cone; spinnerets with anterior pair short and robust, posterior pair about twice as long as anterior pair and slender, middle pair slender and as long as anterior pair; position of colulus indicated by a tuft of black hairs; tracheal spiracle as usual near base of spinnerets.

Epigynum. Epigynal plate considerably swollen in front of genital groove; simple; a considerable distance from posterior margin a smooth white area is bounded behind by a pair of procurved margins extending medially into a low septum partially to divide the white area (Fig. 430).

Color in alcohol. Carapace: dark brown, eyes on black spots and interocular area very dark brown; scattered short white hairs over most of surface with some concentration in the dorsal part of the constriction. Chelicera reddish, very dark in front. Palps reddish brown. Sternum dark brown; maxillae and lip the same with whitish tips. Legs: third coxae and trochanters black, others whitish; first leg with reddish brown tarsi, other segments distal to trochanters yellowish white with brown prolateral and retrolateral stripes on femora, patellae and tarsi; second leg like the first except tarsi are much lighter and brown stripes are less conspicuous; third leg with femora brown; other segments yellowish with brown prolateral stripes on patellae and tibiae; fourth legs with femora, patellae and tibiae brownish, metatarsi and tarsi yellowish white. Abdomen: brownish with a series of seven dorsal yellowish bars, the second the broadest, the last two hardly more than lines; white hair continues the bars dorsolaterally; lateral sides dark brown except the second yellowish bar which continues to venter but not across it; venter with a central brownish stripe bordered with yellowish dots.

Type locality. Female holotype from Canal Zone Biological Area,

July, 1934. Paratypes, most of which are immature, from the following localities: Canal Zone Biological Area, July–Aug., 1936; June, Aug., 1939; Ft. Sherman, C. Z., Aug., 1939; C. Z. Forest Reserve, C. Z., July, Aug., 1939; Frijoles, C. Z., Aug., 1936.

Sarinda stricta spec. nov.

Figures 431–432

Female holotype. Total length 6.27 mm. Carapace 2.37 mm. long, 1.25 mm. wide at PLE which extend somewhat beyond the margins of the carapace, .98 mm. tall and, therefore, .79 as tall as wide; form essentially as in *S. silvatica* sp. nov. but this species is less angular and bold in outline and somewhat more slender; with no median longitudinal thoracic groove visible; without the marked striae so characteristic of *S. silvatica* sp. nov. and the constriction is less marked and somewhat further posterior than in that species.

Eyes. Seen from in front, anterior row recurved so that a line tangent to dorsal borders of ALE cuts off about one eighteenth of the diameter of AME. Posterior row wider than anterior row in ratio of 19 : 18, wider than middle row in ratio of 38 : 31. Quadrangle of laterals wider than long in ratio of 19 : 13. Total eye space occupies three sevenths of the length of the carapace. Ratio of eyes AME : ALE : PME : PLE = 19 : 9.5 : 2.5 : 9. AME contiguous to one another and to ALE. Middle eyes closer to PLE than to ALE in ratio of 5 : 6. Height of clypeus equal to nearly one sixth of the diameter of AME. Clypeus decorated only with a weak ventral fringe of yellowish white bristles, two long brown convergent bristles beneath each AME and two long upturned yellowish bristles in lower angle between AME.

Chelicerae. Parallel, vertical; somewhat swollen in front; basal segment .58 mm. long. Fang rather slender, evenly curved. Fang groove distinct; with four promarginal teeth, the most medial very small, others of moderate size; retromargin with three teeth, all closely crowded together (Fig. 431).

Maxillae. Parallel; longer than wide in middle in ratio of about 25 : 12; only slightly notched in middle of outer border; outer distal corner smoothly rounded with no hook or tubercle.

Lip. Only slightly longer than wide; basal excavations reach nearly to middle; reaches just beyond middle of maxillae. Sternal suture gently procurved.

Sternum. Rather slender, longer than wide in ratio of about 5 : 2; widest at interval between first and second coxae; anterior border about four fifths as wide as base of lip; very slender in posterior quarter; posterior end a sharp point, not extended between fourth coxae which are separated by nearly one third of their diameter.

Legs. 4132. Tibial index of first leg 11, of fourth leg 10.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.05	.47	.98	.75	.43	3.68
2.	.84	.40	.64	.63	.35	2.86
3.	.95	.45	.70	.80	.43	3.33
4.	1.48	.62	1.28	1.22	.54	5.14

All legs slender, with little hair and with no fringes. Palps: two last segments enlarged; with a moderately well developed, dark brown, iridescent, prolateral fringe on last three segments.

Spines. First leg: femur and patella 0; tibia only ventral 2–2–2–2; metatarsus only ventral 2–2. Second leg: as in first except tibia only ventral 2–2–2; metatarsus only prolateral 0–1, ventral 2–2. Third leg: as in first except tibia ventral 1p–0–0; metatarsus prolateral 0–2, retrolateral 0–1, ventral 2–0. Fourth leg: as in first except tibia ventral 0–0–1p; metatarsus prolateral and retrolateral 0–1, ventral 2–1r. Palpal spines: two or three slender black spines at distal end of tarsus.

Abdomen. Rather long and cylindrical, longer than wide in ratio of 29 : 10; slightly constricted just behind first third; anal tubercle a short whitish cone; anterior pair of spinnerets robust and short, other two pairs slender, equally long, but only slightly longer than anterior pair; position of colulus barely indicated; tracheal spiracle near base of spinnerets, with indistinct lip and no tubercle.

Epigynum. Small, rather simple; with a fairly deep posterior marginal notch; just beyond anterior border of notch is a small depressed area surrounded by curved ridges; near anterior end of plate are two nearly contiguous spermathecae; to the right and left of marginal notch are curved internal tubules (Fig. 432).

Color in alcohol. Carapace: rich reddish brown; eyes on black spots; darker along ventral border; scattered white hairs all over surface but definitely concentrated in shallow constriction to make a complete narrow white band accentuating the depth of the groove. Palps light reddish brown. Chelicerae brown, dark in front. Sternum reddish brown with darker border. Maxillae and lip brown with yellowish streaks and whitish tips. Legs: first pair yellowish white, with brown

tarsi and with prolateral brown stripes on patellae and tibiae and retrolateral stripes on tibiae; second leg yellowish white except prolateral brown stripe on femora; third pair with prolateral brown stripe on coxae and trochanters and mostly brown femora, elsewhere yellowish white; fourth legs with coxae and trochanters yellowish white, femora brown, patellae brown at both ends, tibiae mostly brown and light above, elsewhere yellowish white. Abdomen: generally brownish gray with the following yellowish white marks, near base a narrow white girdle passing around just behind genital groove, a broad bar divided dorsally by a narrow brown isthmus and passing obliquely downward to venter, then a series of four chevrons the last two being mere lines; venter brownish behind the light girdle.

Type locality. Female holotype from Frijoles, C. Z., Aug., 1936. No paratypes.

Genus Simonella Peckham, 1885

Simonella americana Peckham, 1885

S. americana Peckham, 1888
S. americana Peckham, 1892
S. americana Simon, 1901
S. americana F. Cambridge, 1900
S. americana Petrunkevitch, 1911
S. americana Banks, 1929

Mr. Banks' male specimen from the Canal Zone Biological Area, June, 1924, seems to be the only record of this species from Panama. It has not yet appeared in my collection.

Simonella bicolor Peckham, 1892

S. bicolor F. Cambridge, 1900
S. bicolor Simon, 1901
S. bicolor Petrunkevitch, 1911
S. bicolor Petrunkevitch, 1925

I have taken three specimens of this species as follows: a mature male, Canal Zone Biological Area, Aug., 1939; an immature female, July, 1939; a very young individual, Ft. Sherman, C. Z., Aug., 1939. It is not yet clear how accurately the females of these two species have been identified, and many features in the males should be carefully studied as soon as sufficient material is available.

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INDEX OF GENERA AND SPECIES[1]

albicincta, Corythalia, 132.
albicincta, Sidusa, 132.
Albionella, 74.
albosignata, *Cyrene*, 168.
albosignata, Freya, 168.
aliceae, Phiale, 205.
americana, Simonella, 468.
Amycus, 346–357.
arraijanica, Freya, 170.
Asamonea, 7.
Ashtabula, 248.
Atelurius, 253.
Attus, 106, 215, 240, 323.
aurantius, Paraphidippus, 323.
aurantius, Salticus, 323.
aureopilosus, Phidippus, 346.
aureus, Paraphidippus, 323.
Avitus, 257.

Balmaceda, 44, 57.
Banksetosa, 78.
banksi, Carabella, 87.
banksi, Lyssomanes, 12.
banksi, Parafluda, 456.
Beata, 257–275, 400.
benigna, Monaga, 196.
benignus, Amycus, 348.
benignus, *Triptolemus*, 348.
bicavata, *Cyrene*, 173.
bicavata, Freya, 173.
bicavata, Sarinda, 460.
bicavatus, Dendryphantes, 287.
bicavatus, Metaphidippus, 287.
bicincta, Corythalia, 132.
bicolor, Simonella, 468.
bicuspidata, *Cyrene*, 207.
bicuspidata, Phiale, 207.
bifida, *Cyrene*, 173.
bifida, Freya, 173.
bifurcata, *Cyrene*, 174.
bifurcata, Freya, 174.
bifurcatus, Cobanus, 364.
bilobata, *Cyrene*, 208.
bilobata, Freya, 208.
bilobata, Phiale, 208.
bispinosus, Dendryphantes, 287.
bispinosus, Metaphidippus, 287.
bivittatus, Menemerus, 48.
Breda, 37.
bryantae, Corythalia, 132.
bryantae, Cotinusa, 90.
bryantae, Lyssomanes, 14.
Bryantella, 389.
bulbosa, *Cyrene*, 174.
bulbosa, Freya, 174.

cambridgei, Cobanus, 360.
canalis, Corythalia, 136.
canalis, Saitis, 136.
Carabella, 86.
castanea, Cylistella, 394.
centralis, Dendryphantes, 287.
centralis, Metaphidippus, 287.
centralis, Myrmarachne, 455.
centralis, Salticus, 455.
centralis, *Toxeus*, 455.
cephalica, Beata, 260.
championi, Myrmarachne, 456.
championi, Toxeus, 456.
Chapoda, 113.
Cheliferoides, 275.
Chinoscopus, 7.
Chira, 117.
Chirothecia, 426.
chrysis, Attus, 323.
chrysis, Paraphidippus, 323.
chrysis, Philaeus, 323.
clara, Corythalia, 140.
Cobanus, 357.
Coccorchestes, 396.
Colonus, 106.
completa, Itata, 54.

[1]Synonyms are in italics.

Compsodecta, 122.
concinna, Cytaea, 239.
conformans, Corythalia, 162.
consimilis, Lyssomanes, 17.
conspecta, Corythalia, 141.
conspecta, *Escambia*, 141.
convexus, Parnaenus, 335.
Corythalia, 125–163.
Cotinusa, 90.
crassus, Orvilleus, 401.
cretatus, Titanattus, 383.
cupreus, Dendryphantes, 288.
cupreus, Metaphidippus, 288.
Cylistella, 394.
Cyrene, 168, 173, 218, 219, 226, 233, 236, 239.
Cytaea, 239.

deinognathus, Lyssomanes, 17.
delecta, *Cyrene*, 212, 219.
delus, Menemerus, 44.
demarcata, Freya, 177.
Dendryphantes, 260, 287, 288, 297, 299, 311, 312.
dentata, Ashtabula, 248.
Descanso, 430.
desidiosa, *Messua*, 405.
desidiosa, Zygoballus, 405.
designata, Chira, 117.
designata, Shira, 117.
Deza, 99.
diffusa, Corythalia, 141.
diolenii, Avitus, 257.
dissimilis, Lyssomanes, 17.
distincta, Freya, 182.
donaldi, Phiale, 212.
Donaldius, 278.
Donatinus, 439.
Dryphias, 400.
dubia, Banksetosa, 78.
dybowskii, Attus, 215.
dybowskii, *Cyrene*, 215.
dybowskii, *Pachomius*, 215.
dybowskii, Phiale, 215.
Dynamius, 145.

eatoni, Lyssomanes, 19.
electus, Cobanus, 369.
electus, Zygoballus, 405.
elegans, *Cyrene*, 218.
elegans, Lyssomanes, 21.
elegans, Phiale, 218.
endigma, Corythalia, 145.
enoplus, Psecas, 99.
Erica, 454.
erythrocras, Cobanus, 374.
Escambia, 141.
eugenia, Erica, 454.
eximia, Gorgasella, 192.
eximia, Toloella, 107.
expallidatus, Dendryphantes, 288.
expallidatus, Metaphidippus, 288.
extensus, Cobanus, 374.
extensus, *Helorus*, 374.
extensus, Helpidius, 374.

facetus, Metaphidippus, 288.
fallax, Amycus, 349.
fastosus, Metaphidippus, 293.
festiva, Chapoda, 114.
festiva, Sidusa, 114.
flava, *Cyrene*, 181.
flava, Freya, 181.
flavens, Cobanus, 374.
flavens, *Helorus*, 374.
flavescens, *Pachomius*, 219.
flavescens, Phiale, 219.
flavolineata, Beata, 260.
flavolineatus, Metaphidippus, 260.
flavus, Chinoscopus, 7.
Fluda, 454.
formicina, Paradamoetas, 459.
formosa, Uluella, 419.
formosa, Zuniga, 447.
Freya, 153, 163, 208, 215.
frontalis, Freya, 181.
Fuentes, 44.
fulva, Cylistella, 394.
fulvoguttata, Corythalia, 145.
furva, Zuniga, 449.
fusca, Parkella, 51.

geminata, *Cyrene*, 219.
geminata, Phiale, 219.
geniculata, Rudra, 72.
Gorgasella, 192.
graciosus, *Pardessus*, 229.
gratiosa, Phiale, 229.
grisea, *Cyrene*, 182.
grisea, Freya, 182.

Habrocestum, 281.
Habronattus, 281.
Hasarius, 240.
Helorus, 374, 377
Helpidius, 374.
hieroglyphicus, Amycus, 349.
Homalattoides, 264.
Homalattus, 400.
Hyllus, 239.

incertus, Atelurius, 253.
incurvus, Cobanus, 375.
inermis, Chapoda, 114.
inermis, Sidusa, 114.
infuscata, *Cyrene*, 182.
infuscata, Freya, 182.
insignis, Carabella, 90.
insignis, Paramarpissa, 90.
insignita, Parahentzia, 316.
insolitus, Descanso, 430.
interrupta, *Cyrene*, 219.
interrupta, Phiale, 219.
iridescens, Metaphidippus, 296.
Itata, 54.

jemineus, Lyssomanes, 21.
Jollas, 241.
Jotus, 145.
justina, Freya, 182.

lanceolatus, Dendryphantes, 299.
lanceolatus, Metaphidippus, 299.
laetabilis, Dendryphantes, 297.
laetabilis, Metaphidippus, 297.
laetificus, Metaphidippus, 299.
latus, Metaphidippus, 304.
laxus, Metaphidippus, 306.
levispina, Beata, 260.
levispinus, Dendryphantes, 260.
levispinus, Metaphidippus, 260.
ligo, Plexippus, 240.
lineola, Phiale, 215.
longipalpus, Dendryphantes, 311.
longipalpus, Metaphidippus, 311.
longipes, Beata, 264.
longipes, *Homalattoides*, 264.
longispina, *Cyrene*, 185.
longispina, Freya, 185.
longithorax, Mica, 57.
lucidus, Donaldius, 278.
lutea, Corythalia, 146.
lutea, Sidusa, 146.
Lyssomanes, 8–33, 54.

Mabellina, 68.
maccuni, Dryphias, 400.
maccuni, Homalattus, 400.
maculatipes, Zygoballus, 410.
maculosa, Phiale, 223.
magna, Beata, 264, 400.
magna, Marpissa, 44.
magnifica, *Cyrene*, 226.
magnifica, Phiale, 226.
mandibularis, Cobanus, 377.
mandibularis, *Helorus*, 377.
Marpissa, 37, 44, 48.
Marptusa, 44.
melanognatha, Marpissa, 48.
Menemerus, 44, 48, 240.
Messua, 405.
Metaphidippus, 260, 267, 285–315.
Mica, 57.
milvina, Breda, 37.
mimica, Phiale, 229.
mimicus, *Pardessus*, 229.
mimicus, Plexippus, 229.
minuta, *Cyrene*, 185.
minuta, Freya, 185.
minutus, Jollas, 241.
modesta, Chirothecia, 426.
modesta, Corythalia, 141.

momus, Dendryphantes, 312.
momus, Metaphidippus, 312.
Monaga, 196.
montana, Ashtabula, 251.
montana, Compsodecta, 122.
montanus, Lyssomanes, 22.
multicolor, Attus, 323.
multicolor, Paraphidippus, 323.
munda, Beata, 265.
murcida, Corythalia, 158.
Myrmarachne, 455.

nannispina, Freya, 215.
niger, Donatinus, 440.
nigriventer, Corythalia, 143.
nigriventer, Sidusa, 143.
niveo-guttata, *Cyrene*, 233.
niveo-guttata, Phiale, 233.
notata, Banksetosa, 81.
notata, Breda, 39.

obscurus, Cobanus, 377.
obsoleta, Corythalia, 145.
ochraceus, Dendryphantes, 312.
ochraceus, Metaphidippus, 312.
octonotatus, Dendryphantes, 312.
octonotatus, Metaphidippus, 312.
opima, Corythalia, 145.
optatus, Zygoballus, 410.
orvillei, Phiale, 234.
Orvilleus, 401.

Pachomius, 215, 219.
paganus, Titanattus, 385.
pallida, *Cyrene*, 236.
pallida, Phiale, 236.
palpinalis, Amycus, 349.
panamae, Phiale, 239.
panamana, Chapoda, 114.
panamana, Corythalia, 145.
panamena, Scopocira, 103.
panamense, Phiale, 239.
Paradamoetas, 459.
Parahentzia, 316.
Parafluda, 456.
Paramarpissa, 90.
Paraphidippus, 322.
paratum, Habrocestum, 281.
paratus, Habronattus, 281.
paratus, Pellenes, 281.
Pardessus, 229.
Parkella, 48.
parki, Lyssomanes, 24.
Parnaenus, 334.
Partona, 400.
parvula, Corythalia, 146.
parvula, *Escambia*, 146.
parvula, Sidusa, 146.
patens, Lyssomanes, 26.
paykulli, Attus, 240.
paykulli, Hasarius, 240.
paykulli, Menemerus, 240.
paykulli, Plexippus, 240.
paykulli, *Thotmes*, 240.
peckhami, Amycus, 349.
peckhami, Balmaceda, 58.
peckhami, Chapoda, 114.
Peckhamia, 414.
Pellenes, 281.
peregrinus, Descanso, 435.
peritas, Jollas, 246.
perpastus, Paraphidippus, 324.
perpolitus, Paraphidippus, 326.
perscitus, Metaphidippus, 313.
petrunkevitchi, Freya, 185.
Phiale, 199–240.
Phidippus, 345.
Philaeus, 323.
picta, Balmaceda, 61.
plana, Sebastira, 442.
planus, Cheliferoides, 275.
Plexippus, 229, 240.
pratensis, *Cyrene*, 239.
pratensis, *Hyllus*, 239.
pratensis, Phiale, 239.
prescotti, Mabellina, 68.
prescotti, Peckhamia, 415.
princeps, Fluda, 454.
prominens, *Cyrene*, 188.
prominens, Freya, 188.

propria, Albionella, 74.
Psecas, 99.
pseustes, Thiodina, 106.
puerpera, Thiodina, 106.
puerpera, Colonus, 106.
pulchra, Corythalia, 150.
punctata, Breda, 44.

quadriguttatus, Amycus, 354.
quadriguttatus, Corythalia, 153.
quadriguttatus, Sidusa, 153.
quadrinotatus, Dendryphantes, 315.
quadrinotatus, Metaphidippus, 315.

recondita, Sidusa, 241.
recurvus, Parnaenus, 340.
reducta, Balmaceda, 64.
retiarius, Attus, 106.
retiarius, Dendryphantes, 106.
retiarius, Plexippus, 106.
roseus, *Homalattoides*, 400.
roseus, Partona, 400.
Rudra, 72.
rusticus, Dryphias, 400.

sagittifer, Freya, 181.
Saitis, 136.
Salticus, 48, 323, 455.
saphes, Lyssomonea, 348.
Sarinda, 459.
scarabaeoides, Cylistella, 396.
Scopocira, 103.
Sebastira, 442.
seclusus, Cobanus, 380.
serrapophysis, Corythalia, 153.
serrapophysis, Freya, 153.
Shira, 117.
shropshirei, Lyssomanes, 27.
Sidusa, 114, 132, 143, 145, 146, 153, 158, 162, 163, 241.
silvatica, Sarinda, 463.
Simonella, 468.
simoni, Cotinusa, 96.
sitticus, Corythalia, 132.
speciosa, Bryantella, 390.
spinnifer, Lyssomanes, 21.
spiralifer, Amycus, 354.
spiralis, Corythalia, 158.
spiralis, Sidusa, 158.
spirorbis, Corythalia, 162.
spirorbis, Sidusa, 162.
striata, Beata, 267.
striata, Freya, 188.
stricta, Sarinda, 466.
subfuscus, Cobanus, 382.
sulphurea, Corythalia, 162.
sulphurea, Sidusa, 162.
sumptuosa, *Deza*, 99.
sylvana, Thiodina, 106.
Synageles, 418.

Thiodina, 106.
Thotmes, 240.
Titanattus, 383.
Toloella, 106.
Toxeus, 455, 456.
trifurcatus, Lyssomanes, 26.
tulineba, Sidusa, 132.
turneri, Balmaceda, 66.

Uluella, 419.
uncinella, Freya, 174.
unicolor, Cobanus, 382.

validus, Paraphidippus, 330.
variegata, Beata, 267.
variegata, Metaphidippus, 267.
variegata, Peckhamia, 418.
variegatus, *Synageles*, 418.
venusta, Beata, 271.
venusta, Parkella, 49.
voluta, Corythalia, 163.
voluta, Sidusa, 163.

zeteki, Amycus, 355.
zeteki, Beata, 273.
zeteki, Lyssomanes, 29.
Zuniga, 447.
Zygoballus, 404.

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